The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA II

Thursday, January 22, 2026 — 1:15 to 4:15 p.m., only

MODEL RESPONSE SET

Table of Contents

Question 25.....2
Question 26.....7
Question 27.....12
Question 28.....17
Question 29.....23
Question 30.....29
Question 31.....35
Question 32.....41
Question 33.....47
Question 34.....57
Question 35.....67
Question 36.....77
Question 37.....86

Question 25

25 The number of people at a concert t hours after the doors open can be modeled by the equation $B(t) = 250(1.8)^t$. Determine how much time, to the *nearest hundredth of an hour*, must pass before the number of people reaches 2000.

$2000 = 250(1.8)^t$

$8 = 1.8^t$

$\frac{\log 8}{\log 1.8} = \frac{t \log 1.8}{\log 1.8}$

$t = 3.54$ hours

Score 2: The student gave a complete and correct response.

Question 25

25 The number of people at a concert t hours after the doors open can be modeled by the equation $B(t) = 250(1.8)^t$. Determine how much time, to the *nearest hundredth of an hour*, must pass before the number of people reaches 2000.

$250(1.8)^3 = 1458$

$250(1.8)^{3.5} = 1956.112267$

$250(1.8)^{3.53} = 1990.911484$

$250(1.8)^{3.54} = 2002.648256$

$3.54 = t$

Score 2: The student gave a complete and correct response.

Question 25

25 The number of people at a concert t hours after the doors open can be modeled by the equation $B(t) = 250(1.8)^t$. Determine how much time, to the *nearest hundredth of an hour*, must pass before the number of people reaches 2000.

$B(t) = 250(1.8)^t$

$B(t) = 450^t$

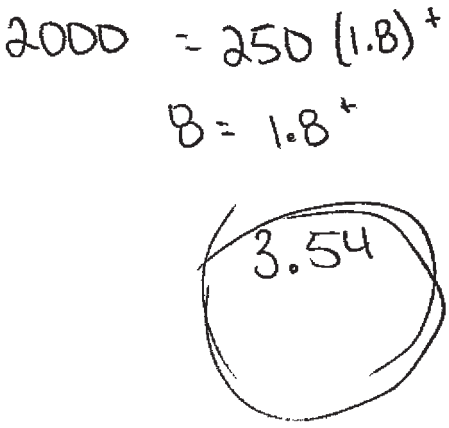
$\frac{\log 2000}{\log 450} = \frac{t \log 450}{\log 450}$

$1.24 = t$

Score 1: The student made a conceptual error.

Question 25

25 The number of people at a concert t hours after the doors open can be modeled by the equation $B(t) = 250(1.8)^t$. Determine how much time, to the *nearest hundredth of an hour*, must pass before the number of people reaches 2000.



Score 1: The student did not show enough relevant course-level correct work to receive full credit.

Question 25

25 The number of people at a concert t hours after the doors open can be modeled by the equation $B(t) = 250(1.8)^t$. Determine how much time, to the *nearest hundredth of an hour*, must pass before the number of people reaches 2000.

$\frac{B(t)}{250} = \frac{250(1.8)^t}{250}$

$250 = 1.8^t$

$\frac{\log 250}{\log 1.8} = \frac{t \log 1.8}{\log 1.8}$

$9.394 = t$

Score 0: The student made multiple errors.

Question 26

26 On a day in June 2017 on Staten Island, the function $T(h) = 8\sin\left(\frac{\pi}{12}h\right) + 82$ was used to model the temperature, T, in degrees Fahrenheit, h hours after 9 a.m.

State the value of $T(6)$ and explain its meaning in this context.

$T(6) = 8\sin\left(\frac{6\pi}{12}\right) + 82$

$T(6) = 8\sin\left(\frac{\pi}{2}\right) + 82$

$T(6) = 90$

T(6) means that at 3pm, the temperature reaches its maximum value of 90° F.

Score 2: The student gave a complete and correct response.

Question 26

26 On a day in June 2017 on Staten Island, the function $T(h) = 8\sin\left(\frac{\pi}{12}h\right) + 82$ was used to model the temperature, T, in degrees Fahrenheit, h hours after 9 a.m.

State the value of $T(6)$ and explain its meaning in this context.

T(6) = Temp 6 hours after the ninth hour.

Here's T(6) solved: $8\sin\left(\frac{\pi}{12}6\right)+82=$

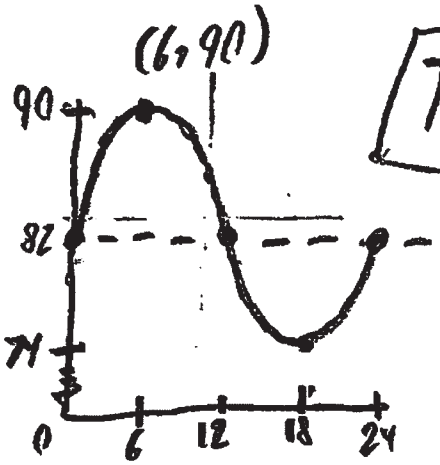
90 Fahrenheit

Score 2: The student gave a complete and correct response.

Question 26

26 On a day in June 2017 on Staten Island, the function $T(h) = 8\sin\left(\frac{\pi}{12}h\right) + 82$ was used to model the temperature, T, in degrees Fahrenheit, h hours after 9 a.m.

State the value of $T(6)$ and explain its meaning in this context.



T(6) = 90

$p = \frac{2\pi}{\frac{\pi}{12}} = 24$

amp = 8

mid = 82

min = 74

max = 90

T(6) is the maximum

Score 1: The student wrote an explanation without context.

Question 26

26 On a day in June 2017 on Staten Island, the function $T(h) = 8\sin\left(\frac{\pi}{12}h\right) + 82$ was used to model the temperature, T, in degrees Fahrenheit, h hours after 9 a.m.

State the value of $T(6)$ and explain its meaning in this context.

$T(h) = 8\sin\left(\frac{\pi}{12}h\right) + 82$

$T(6) = 8\sin\left(\frac{\pi}{12}(6)\right) + 82$

$T(6) \approx 82°$

This value expresses that it was approximately 82°F at around 3:00 P.M. on a day in June 2017.

Score 1: The student did not evaluate using radians.

Question 26

26 On a day in June 2017 on Staten Island, the function $T(h) = 8\sin\left(\frac{\pi}{12}h\right) + 82$ was used to model the temperature, T, in degrees Fahrenheit, h hours after 9 a.m.

State the value of $T(6)$ and explain its meaning in this context.

$T(6) = 8\sin\left(\frac{\pi}{12}(6)\right) + 82$

$T(6) = 82.22$

the predicted temperature is 82.22°F

Score 0: The student made one computational error and wrote an incomplete explanation.

Question 27

27 Use properties of exponents to show why $(-64)^{\frac{2}{3}} = 16$.

Justify your answer.

$\frac{1}{3} \cdot \frac{2}{1}$

$(-64)^{\frac{2}{3}} = 16$

$((-64)^{2})^{1/3} = 16$

$4096^{1/3} = 16$

$16 = 16$

Score 2: The student gave a complete and correct response.

Question 27

27 Use properties of exponents to show why $(-64)^{\frac{2}{3}} = 16$.

Justify your answer.

$\sqrt[3]{(-64)^2}$

$\sqrt[3]{4096}$

16

Score 2: The student gave a complete and correct response.

Question 27

27 Use properties of exponents to show why $(-64)^{\frac{2}{3}} = 16$.

Justify your answer.

$(-64)^{2/3} = 16$

$(-64^2)^{1/3} = 16$

$(4096)^{1/3} = 16$

$16 = 16$

Score 1: The student made one computational error.

Question 27

27 Use properties of exponents to show why $(-64)^{\frac{2}{3}} = 16$.

Justify your answer.

$\left((-64)^{\frac{1}{3}}\right)^2$ $(-64)^{\frac{2}{3}}$ does not equal 16

$(-4)^2$

$16 \neq 16$.

Score 1: The student made one computational error.

Question 27

27 Use properties of exponents to show why $(-64)^{\frac{2}{3}} = 16$.

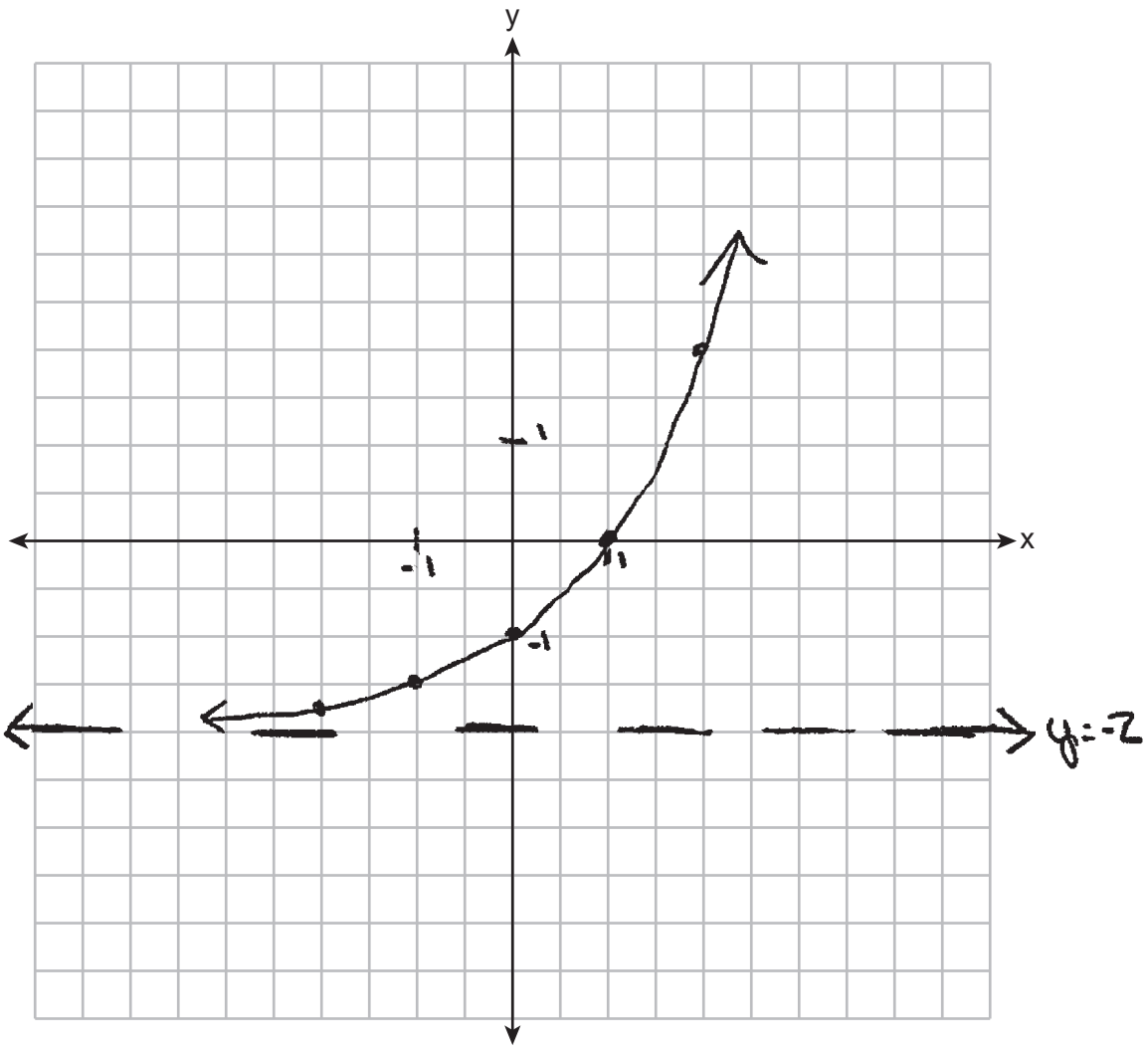
Justify your answer.

$(-64)^{2/3} = 2\sqrt{64} = 16$

Score 0: The student made multiple errors.

Question 28

28 Graph $y = 2^x - 2$ on the axes below.



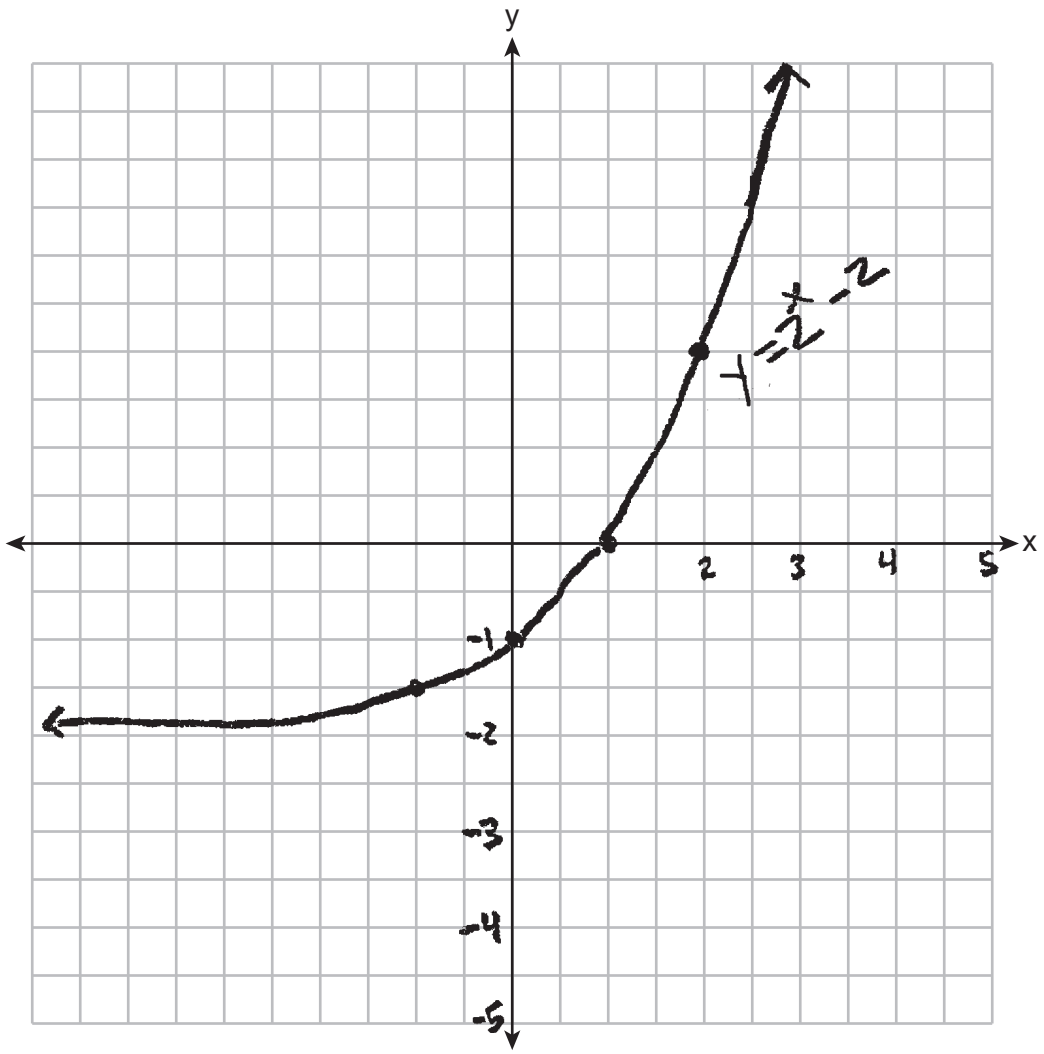
State the equation of the asymptote.

y=-2 is the asymptote

Score 2: The student gave a complete and correct response.

Question 28

28 Graph $y = 2^x - 2$ on the axes below.



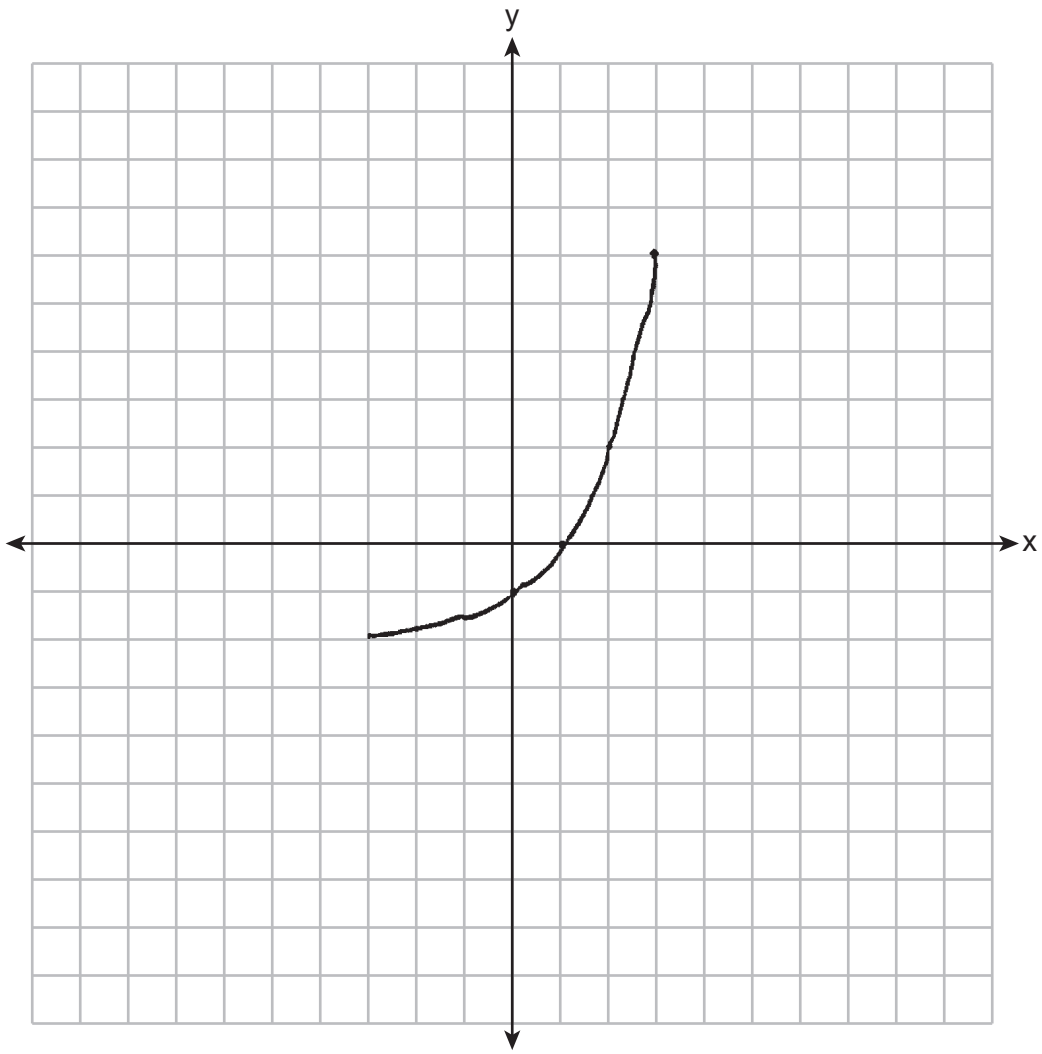
State the equation of the asymptote.

Asymptote: y = -2

Score 2: The student gave a complete and correct response.

Question 28

28 Graph $y = 2^x - 2$ on the axes below.



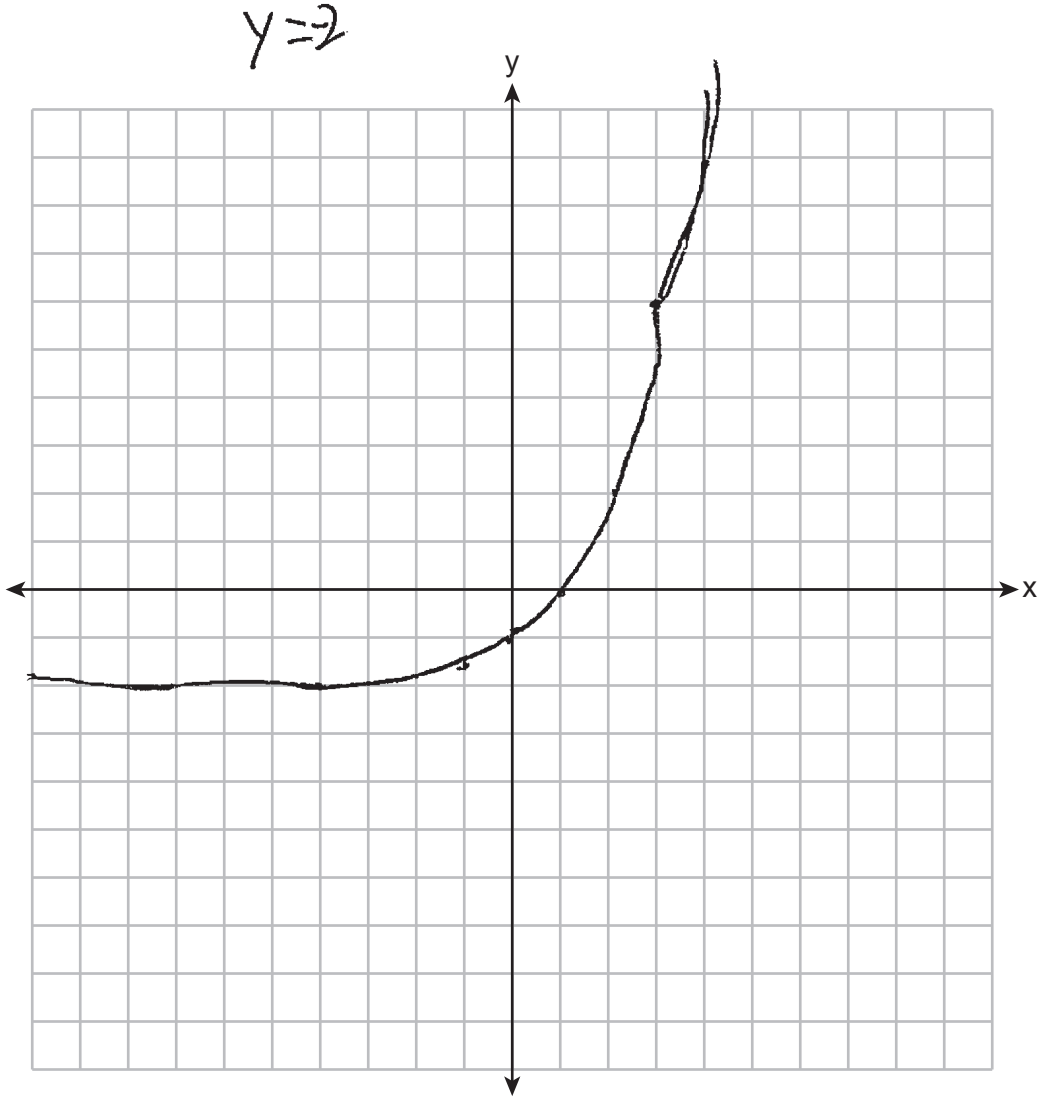
State the equation of the asymptote.

asymptote: y=-2

Score 1: The student did not include arrows or use the full extent of the grid.

Question 28

28 Graph $y = 2^x - 2$ on the axes below.

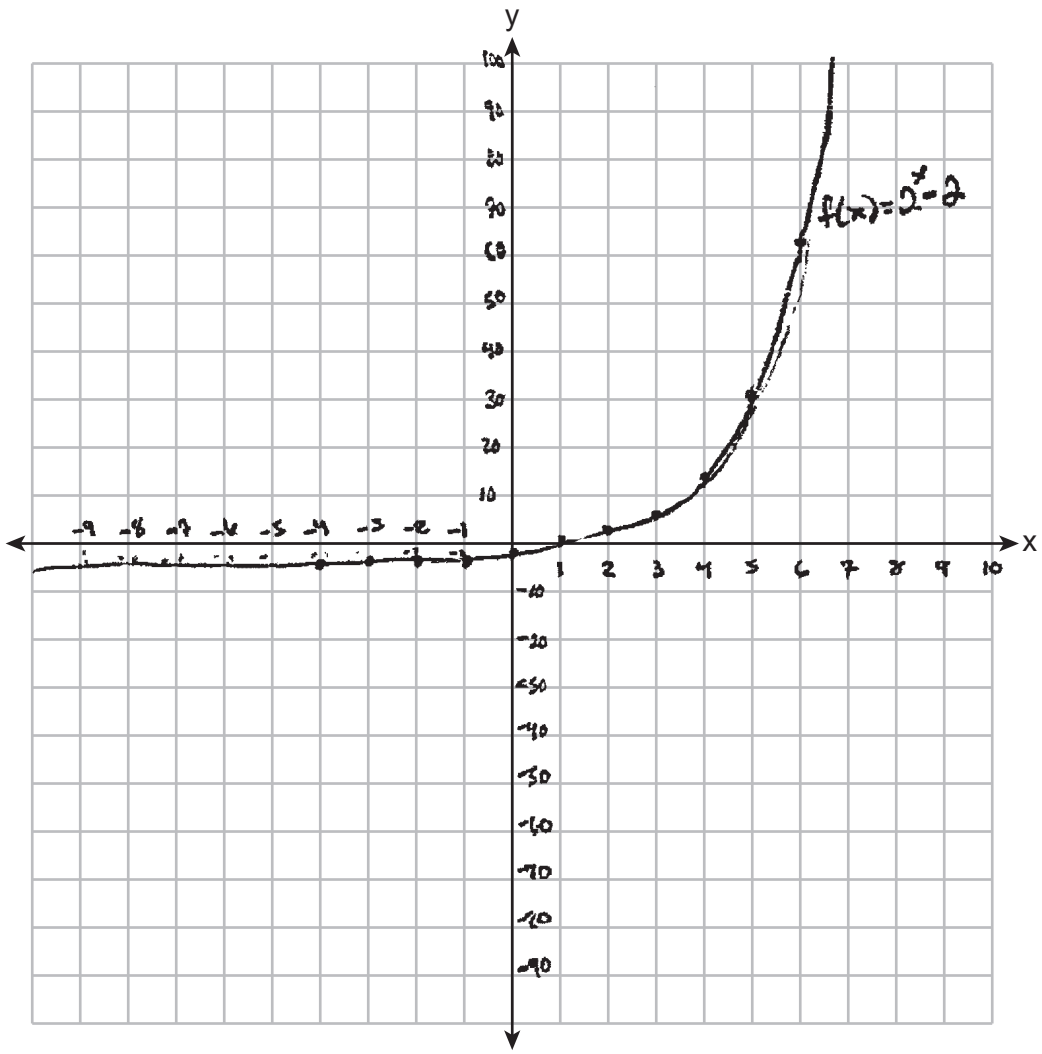


State the equation of the asymptote.

Score 1: The student correctly stated the equation of the asymptote.

Question 28

28 Graph $y = 2^x - 2$ on the axes below.

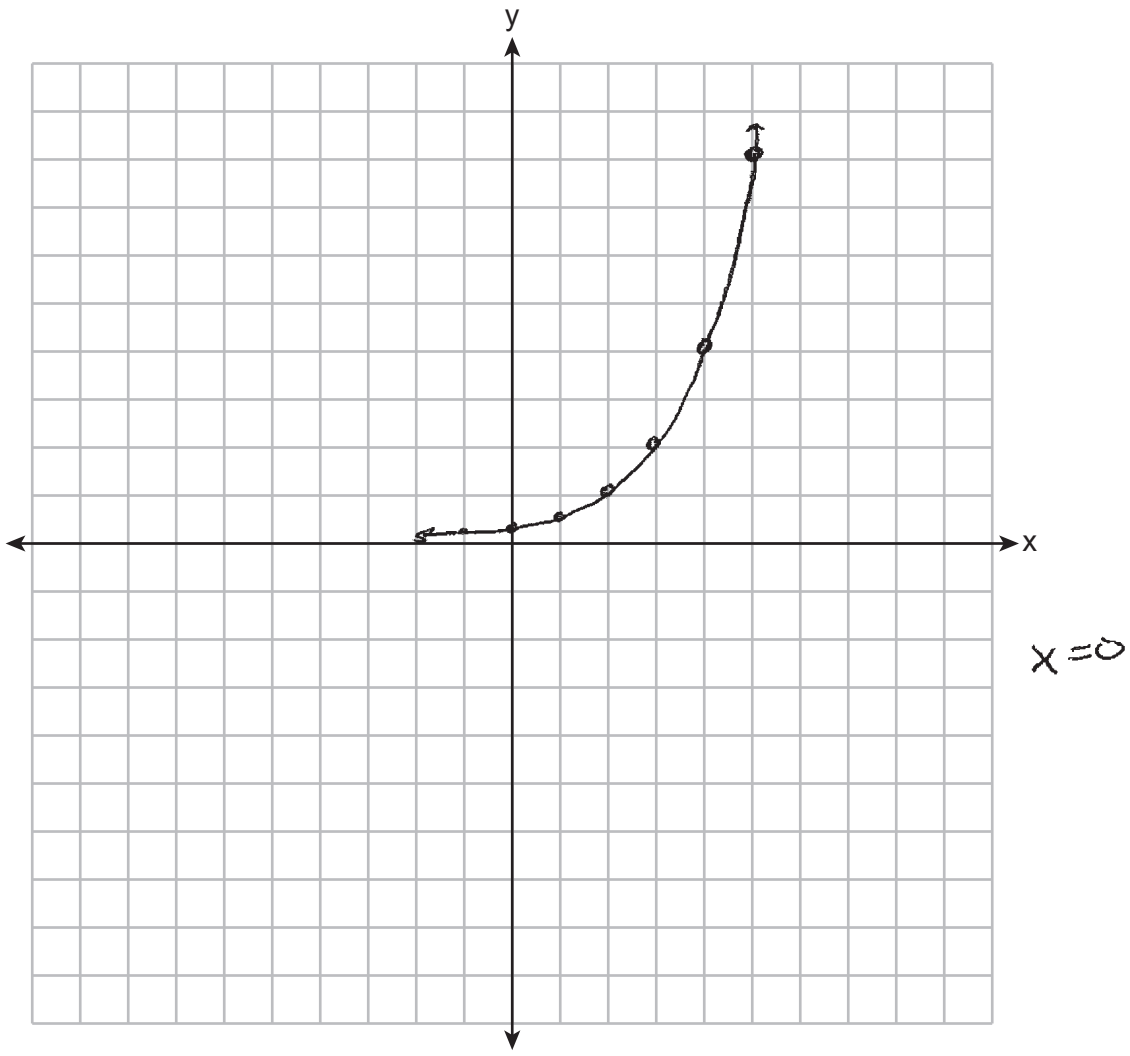


State the equation of the asymptote.

Score 0: The student made a graphing error by graphing below the asymptote and did not state the equation for the asymptote.

Question 28

28 Graph $y = 2^x - 2$ on the axes below.



State the equation of the asymptote.

Score 0: The student drew an incorrect graph and stated an incorrect equation for the asymptote.

Question 29

29 In a survey of students at a large high school, 58% speak English fluently, 24% speak Mandarin fluently, and 16% speak English and Mandarin fluently. Determine the percentage of students at the school who speak English or Mandarin fluently.

A 58%. speak english

B 24%. speak mandarin

16%. speak english & mandarin

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \cup B) = (.58) + (.24) - (.16)$

$P(A \cup B) = .66$

66%. speak english or mandarin

Score 2: The student gave a complete and correct response.

Question 29

29 In a survey of students at a large high school, 58% speak English fluently, 24% speak Mandarin fluently, and 16% speak English and Mandarin fluently. Determine the percentage of students at the school who speak English or Mandarin fluently.

	Speak English	Not English	Total
Speak M	16	8	24
Don't speak M	42	34	76
Total	58	42	100

100 - 34 = 66

(58 + 24) - 16 = 66

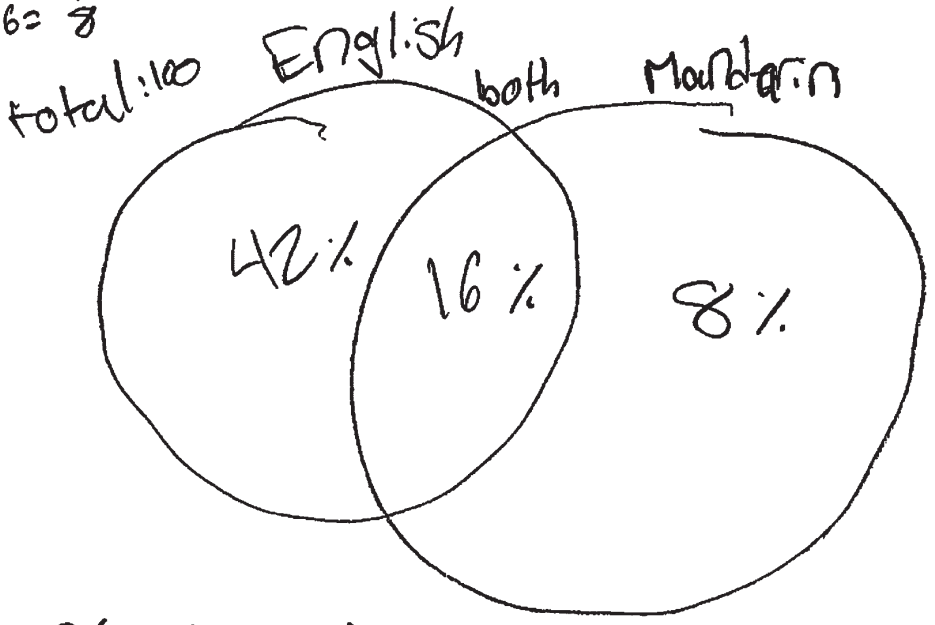
66% of the Students at School Speak English or Mandarin fluently

Score 2: The student gave a complete and correct response.

Question 29

29 In a survey of students at a large high school, 58% speak English fluently, 24% speak Mandarin fluently, and 16% speak English and Mandarin fluently. Determine the percentage of students at the school who speak English or Mandarin fluently.

58-16=42
24-16=8



$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \cup B) = 42 + 8 - 16$

$P(A \cup B) = 50 - 16$

$P(A \cup B) = 34$

Score 1: The student made a conceptual error.

Question 29

29 In a survey of students at a large high school, 58% speak English fluently, 24% speak Mandarin fluently, and 16% speak English and Mandarin fluently. Determine the percentage of students at the school who speak English or Mandarin fluently.

English = $\frac{.58}{1}$

Mandarin = $\frac{.24}{1}$

Both = $\frac{.16}{1}$

$.82 - .16$

$\frac{.66}{1}$

Score 1: The student did not write the answer as a percentage.

Question 29

29 In a survey of students at a large high school, 58% speak English fluently, 24% speak Mandarin fluently, and 16% speak English and Mandarin fluently. Determine the percentage of students at the school who speak English or Mandarin fluently.

58% → English
24% → Mandarin
16% → English + Mandarin

58 + 16 + 24 = 98

÷2 ← % that

16 ÷ 2 = 8

8% of the students at school speak english/mandarin fluently

Score 0: The student did not show enough correct work to receive any credit.

Question 29

29 In a survey of students at a large high school, 58% speak English fluently, 24% speak Mandarin fluently, and 16% speak English and Mandarin fluently. Determine the percentage of students at the school who speak English or Mandarin fluently.

58% english
24% Mandarin
16% E+M
English or Mandarin fluently?

16:2 = 8%

58+8=66% english

24+8=32% mandarin

Score 0: The student did not show enough correct work to receive any credit.

Question 30

30 The following table represents the number of years after 1980, x, and the median value of a home in the United States in thousands of dollars, y.

x	1	10	20	30	40
y	59.07	97.02	131.6	180.7	269.2

Based on these data, write an exponential regression equation to model the median home value, in thousands of dollars, x years after 1980. Round all coefficients to the *nearest hundredth*.

ExpReg in calc

$a = 61.14$

$b = 1.04$

$y = 61.14(1.04)^x$

Score 2: The student gave a complete and correct response.

Question 30

30 The following table represents the number of years after 1980, x, and the median value of a home in the United States in thousands of dollars, y.

x	1	10	20	30	40
y	59.07	97.02	131.6	180.7	269.2

Based on these data, write an exponential regression equation to model the median home value, in thousands of dollars, x years after 1980. Round all coefficients to the *nearest hundredth*.

$y = 61.14(1.04)^x$

Score 2: The student gave a complete and correct response.

Question 30

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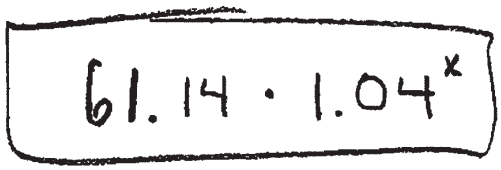


Score 1: The student did not write an equation.

Question 30

30 The following table represents the number of years after 1980, x, and the median value of a home in the United States in thousands of dollars, y.

x	1	10	20	30	40
y	59.07	97.02	131.6	180.7	269.2

Based on these data, write an exponential regression equation to model the median home value, in thousands of dollars, x years after 1980. Round all coefficients to the *nearest hundredth*.

$y = (61.14 \cdot 1.04)^x$

Score 1: The student misplaced parentheses.

Question 30

30 The following table represents the number of years after 1980, x, and the median value of a home in the United States in thousands of dollars, y.

x	1	10	20	30	40
y	59.07	97.02	131.6	180.7	269.2

Based on these data, write an exponential regression equation to model the median home value, in thousands of dollars, x years after 1980. Round all coefficients to the *nearest hundredth*.

$y = 5.15x + 43.43$

Score 1: The student wrote a linear regression.

Question 30

30 The following table represents the number of years after 1980, x, and the median value of a home in the United States in thousands of dollars, y.

x	1	10	20	30	40
y	59.07	97.02	131.6	180.7	269.2

Based on these data, write an exponential regression equation to model the median home value, in thousands of dollars, x years after 1980. Round all coefficients to the *nearest hundredth*.

$A = P(1 - \%)^t$

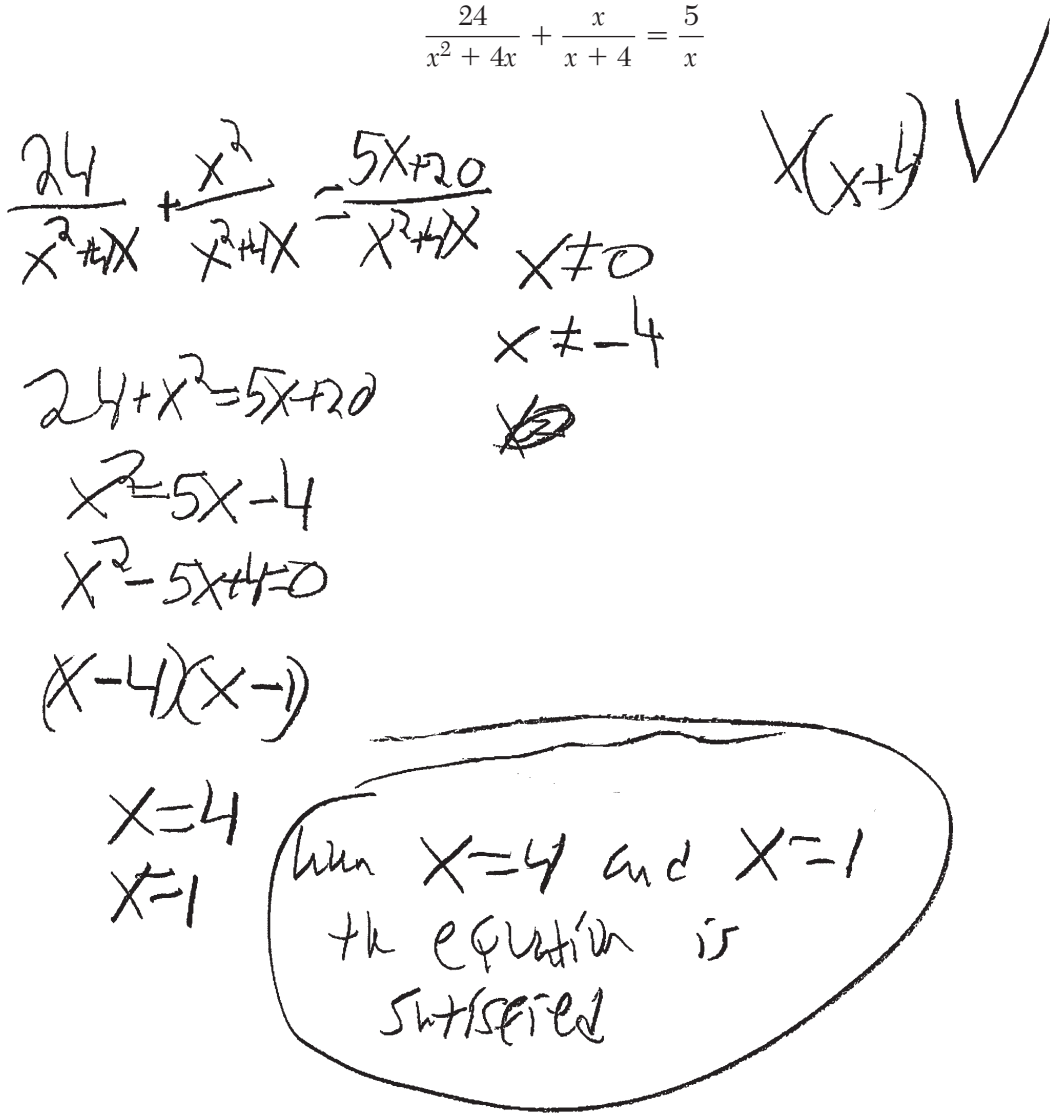
$A = 5{,}907\,(1 - .00)^x$

Score 0: The student did not satisfy the criteria for one or more credits.

Question 31

31 Solve algebraically for all values of x that satisfy the equation below.

$$\frac{24}{x^2 + 4x} + \frac{x}{x + 4} = \frac{5}{x}$$



Score 2: The student gave a complete and correct response.

Question 31

31 Solve algebraically for all values of x that satisfy the equation below.

$$\frac{24}{x^2 + 4x} + \frac{x(x)}{x(x + 4)} = \frac{5(x+4)}{(x)(x+4)}$$

$24 + x^2 = 5x + 20$
$-20 \quad\quad -20$

$4 + x^2 = 5x$
$-5x \quad\quad -5x$

$x^2 - 5x + 4 = 0$

$(x - 4)(x - 1)$

$x - 4 = 0$ $\quad$ $x - 1 = 0$
$+4 \quad +4$ $\quad$ $+1 \quad +1$
$x = 4$ $\quad$ $x = 1$

$x = 4$
$x = 1$

Score 2: The student gave a complete and correct response.

Question 31

31 Solve algebraically for all values of x that satisfy the equation below.

$$\frac{24}{x^2+4x}+\frac{x}{x+4}=\frac{5}{x}$$

$\frac{24}{x^2+4x} + \frac{x^2}{x^2+4x} = \frac{5}{x}$

$\frac{24+x^2}{x^2+4x} = \frac{5}{x}$

$24x + x^3 = 5x^2 + 20x$

$x^3 + 4x - 5x^2 = 0$

$x^3 - 5x^2 + 4x = 0$

$x(x^2 - 5x + 4) = 0$

$x(x-1)(x-4)$

0, 1, 4

Score 1: The student did not reject an extraneous root.

Question 31

31 Solve algebraically for all values of x that satisfy the equation below.

$$\frac{24}{x^2 + 4x} + \frac{x}{x + 4} = \frac{5}{x}$$

$\frac{24}{x^2+4x} + \frac{x^2}{x^2+4x} = \frac{5x+20}{x^2+4x}$

$24 + x^2 = 5x + 20$

$x^2 - 5x + 4 = 0$

$\frac{-(-5) \pm \sqrt{(-5)^2 - 4(4)}}{2}$

$-b \pm \sqrt{b^2 - 4ac}$ / $2a$

$x = \{6.5, 3.5\}$

Score 1: The student wrote a correct quadratic equation in standard form.

Question 31

31 Solve algebraically for all values of x that satisfy the equation below.

$$\frac{24}{x^2+4x}+\frac{x}{x+4}=\frac{5}{x}$$

(x)(x+4)

$\frac{24}{x^2+4x} + \frac{x^2}{x^2+4x} = \frac{5x+20}{x^2+4x}$

$x^2+5x+4=0$

4 | 5 | 1

$x^2+x+4x+4=0$

$x(x+1)+4(x+1)$

$(x+4)(x+1)=0$

$x+4=0$ $\quad -4 \quad -4$

$x=-4$

$x+1=0$ $\quad -1 \quad -1$

$x=-1$

$x=-4$

$x=-1$

Score 0: The student made a transcription error and did not check for extraneous solutions.

Question 31

31 Solve algebraically for all values of x that satisfy the equation below.

$$\left(\frac{24}{x^2+4x}+\frac{x}{x+4}\right)\left(\frac{5}{x}\right)$$

$x+4+2x$

$\sqrt{x^2+4x}$

$x+2x$

$24(x+4)+x(x+2x)=5(x+4+2x)$

$24x+96+x^2+2x^2=5x+20+10x$

$-5x\ -20-10x \qquad -5x\ -20-10x$

$9x+76+3x^2=0$

$3x^2+9x+76=0$

$\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $\qquad \frac{-9\pm\sqrt{9^2-4(3)(76)}}{2(3)}$

$\frac{-9\pm\sqrt{-831i}}{6}$ $\qquad \frac{-9+\sqrt{-831i}}{6}$ $\qquad \frac{-9-\sqrt{-831i}}{6}$

Score 0: The student made multiple errors.

Question 32

32 Express $i(x + i) - (x - i)^2$ in simplest $a + bi$ form.

$xi + i^2 - \cdot$

$(x-i)(x-i)$

$x^2 - xi - xi + i^2$

$-2xi$

$xi + i^2 + -x^2 + 2xi - i^2$

$3xi$

$-x^2 + 3xi$

Score 2: The student gave a complete and correct response.

Question 32

32 Express $i(x + i) - (x - i)^2$ in simplest $a + bi$ form.

$-(x-i)(x-i)$

$ix + i^2 - x^2 + ix + ix - i^2$

$3xi - x^2$

Score 2: The student gave a complete and correct response.

Question 32

32 Express $i(x + i) - (x - i)^2$ in simplest $a + bi$ form.

$xi - 1 - x^2 + 2xi + 1$

$-x^2 + 3xi$

$-x(x - 3i)$

Score 1: The student did not write their final answer in $a + bi$ form.

Question 32

32 Express $i(x + i) - (x - i)^2$ in simplest $a + bi$ form.

$ix + i^2 - x^2 - 2xi + i^2$

$ix - 1 - x^2 - 2xi - 1$

$-x^2 - 2 - 1xi$

Score 1: The student did not distribute the negative sign.

Question 32

32 Express $i(x + i) - (x - i)^2$ in simplest $a + bi$ form.

$xi - 1 \cdot -$

	x	-1
x	x^2	$-xi$
$-i$	$-xi$	-1^2

$x^2 + x1 - xi + 1$

$x^2 - 2x1 + 1$

$xi - 1 - x^2 - 2xi + 1$

$x^2 - x1$

Score 0: The student made multiple errors.

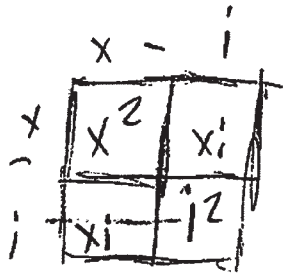
Question 32

32 Express $i(x + i) - (x - i)^2$ in simplest $a + bi$ form.

$ix + i^2 - x^2 + xi^2 + -1$

$ix + \cancel{+1} - x^2 + xi^2 + \cancel{+1}$

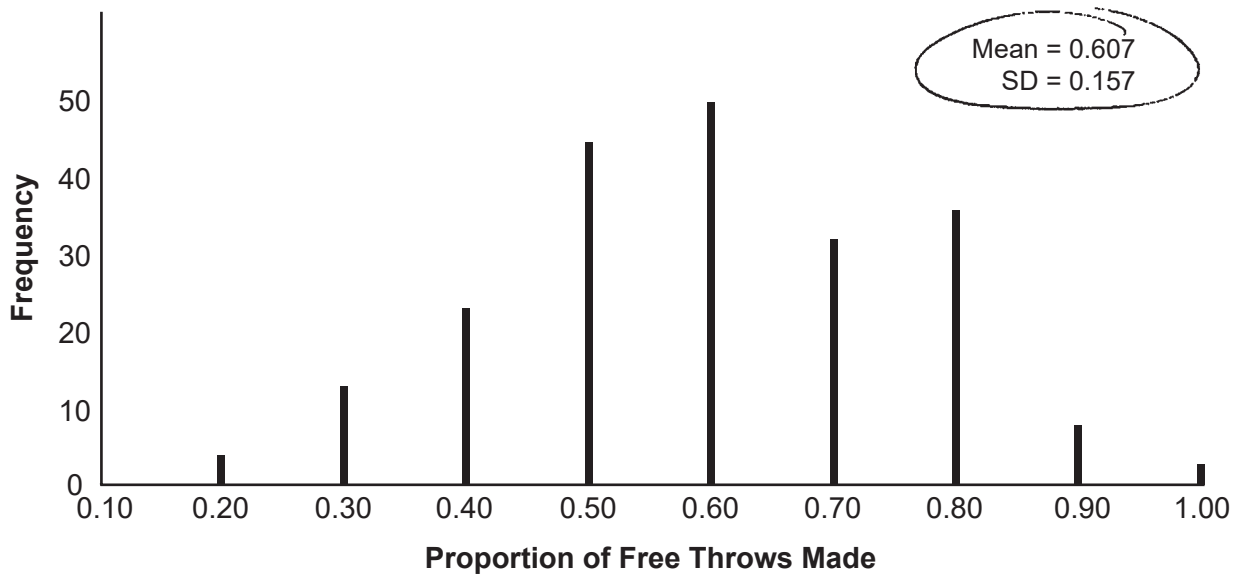
$ix - x^2 + xi^2$



Score 0: The student made multiple errors.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.



Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

$0.607 \pm 2(0.157)$

$(0.293, 0.921)$

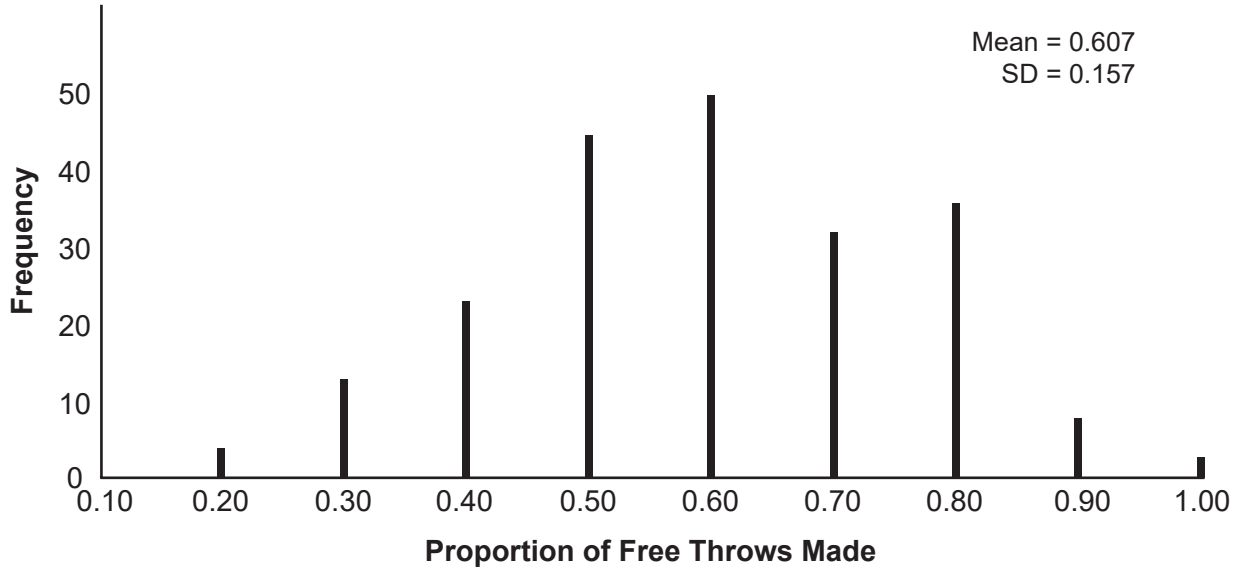
Do the fans have a valid argument? Explain using statistical evidence.

The fans do not have a valid argument because making 3/10 free throws (.3) falls within the confidence interval for this simulation so it is not unusual.

Score 4: The student gave a complete and correct response.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.



Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

middle 95% = mean ± M.O.E.
= .607 ± 2(.157)
(.293, .921)

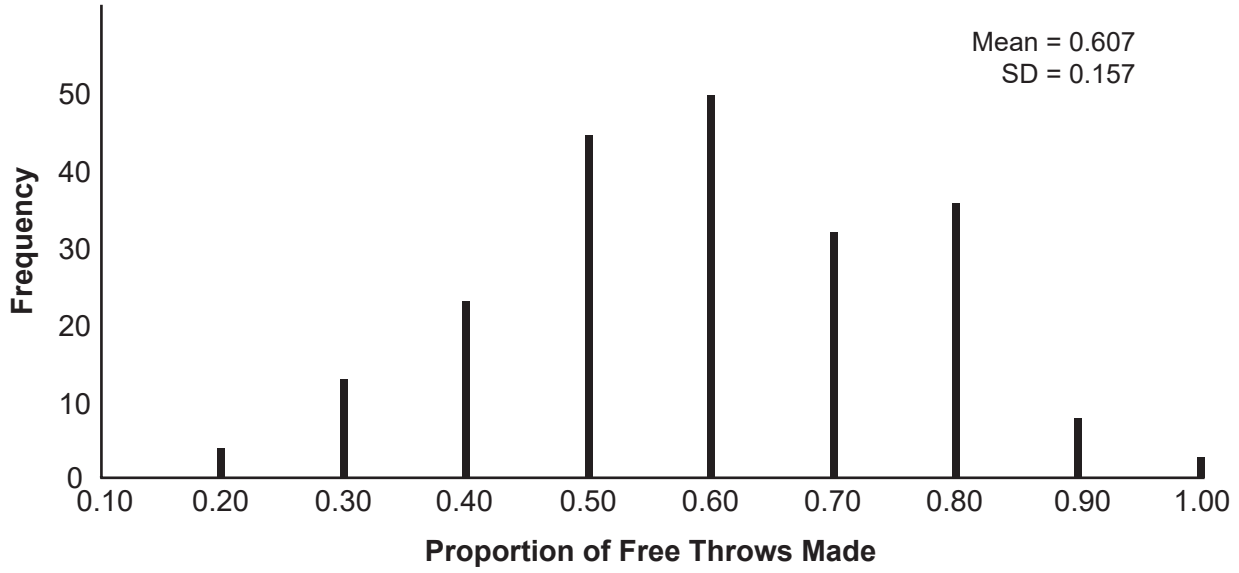
Do the fans have a valid argument? Explain using statistical evidence.

They do not have a valid argument because 30% of shots made are in the middle 95% of the data.

Score 4: The student gave a complete and correct response.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.



Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

.293 - .921

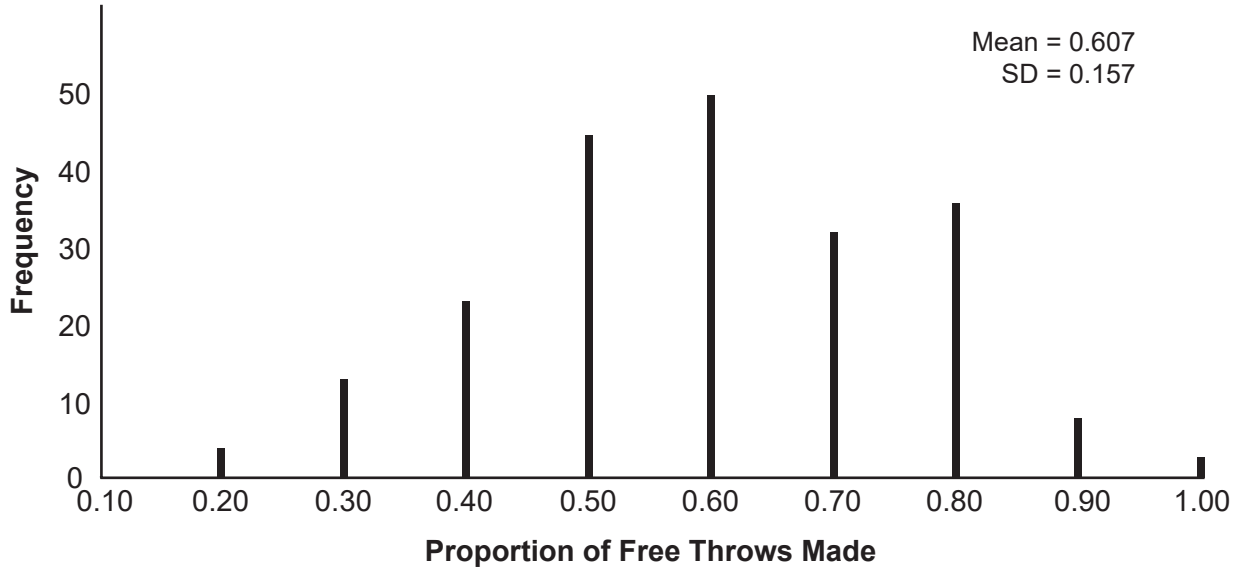
Do the fans have a valid argument? Explain using statistical evidence.

No, 3/10 / .3 falls inside the middle 95% so it isn't statistically significant.

Score 3: The student did not show work to obtain the interval.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.



Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

.607 ± 2(.157)
.293 to .921

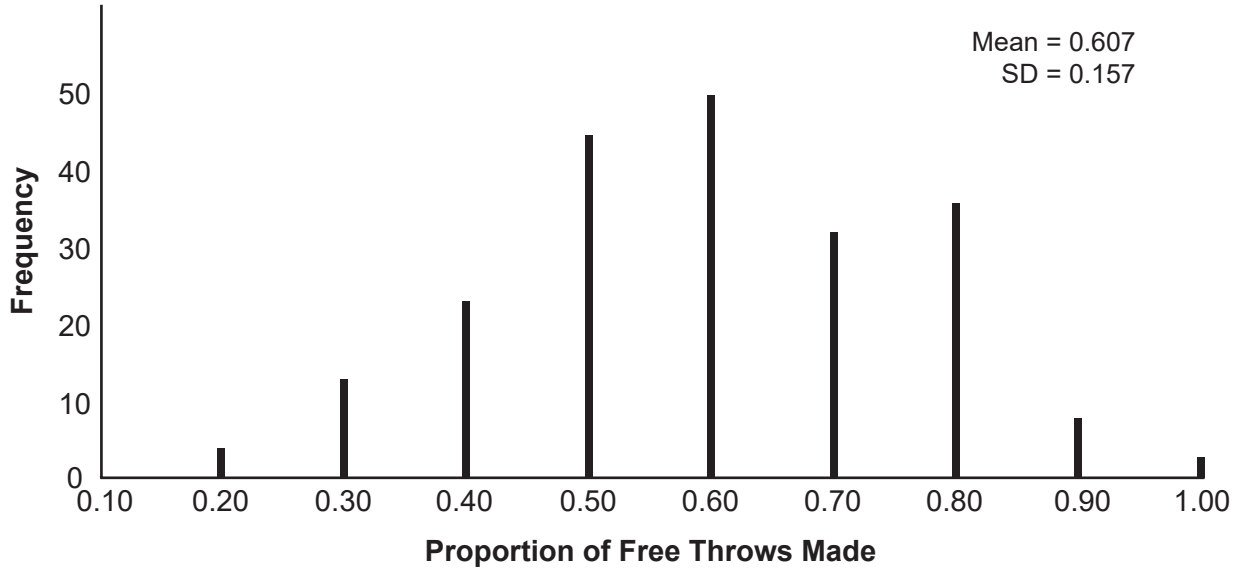
Do the fans have a valid argument? Explain using statistical evidence.

30% = .3 .3 were hit, during the last 4 minutes, .3 is not significant, therefore the fans don't have a valid argument.

Score 3: The student gave an incomplete explanation by not referencing the interval.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.



Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

$0.607 + 2(0.157) = 0.921$

$0.607 - 2(0.157) = 0.293$

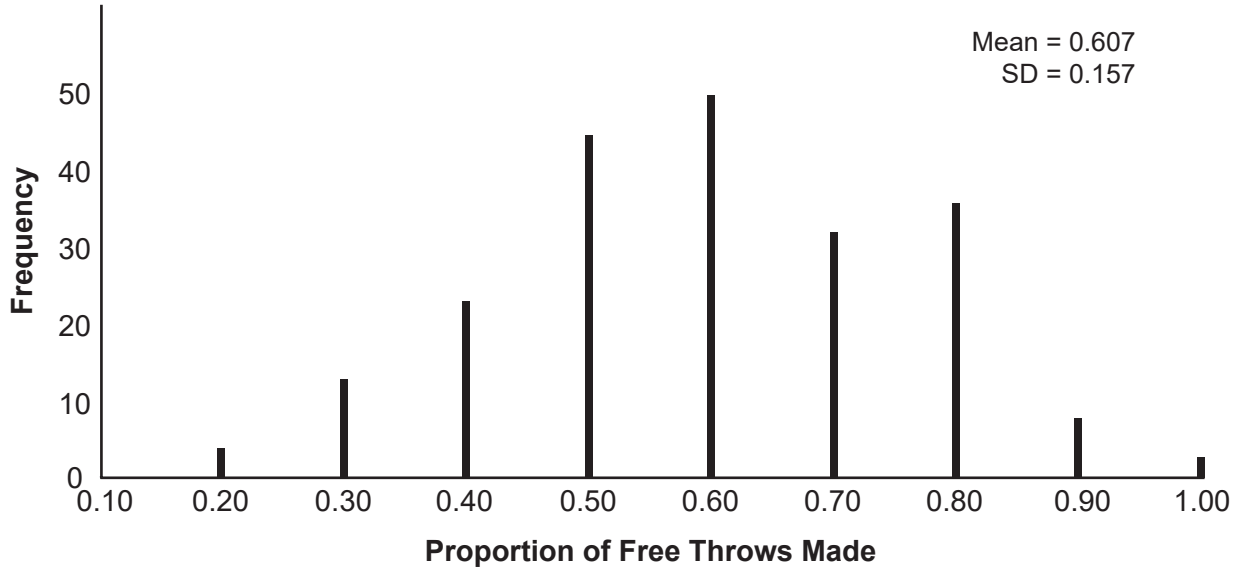
Do the fans have a valid argument? Explain using statistical evidence.

No because the data is inbetween the interval.

Score 2: The student did not write an interval and provided an incomplete explanation.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.



Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

.29 – .92

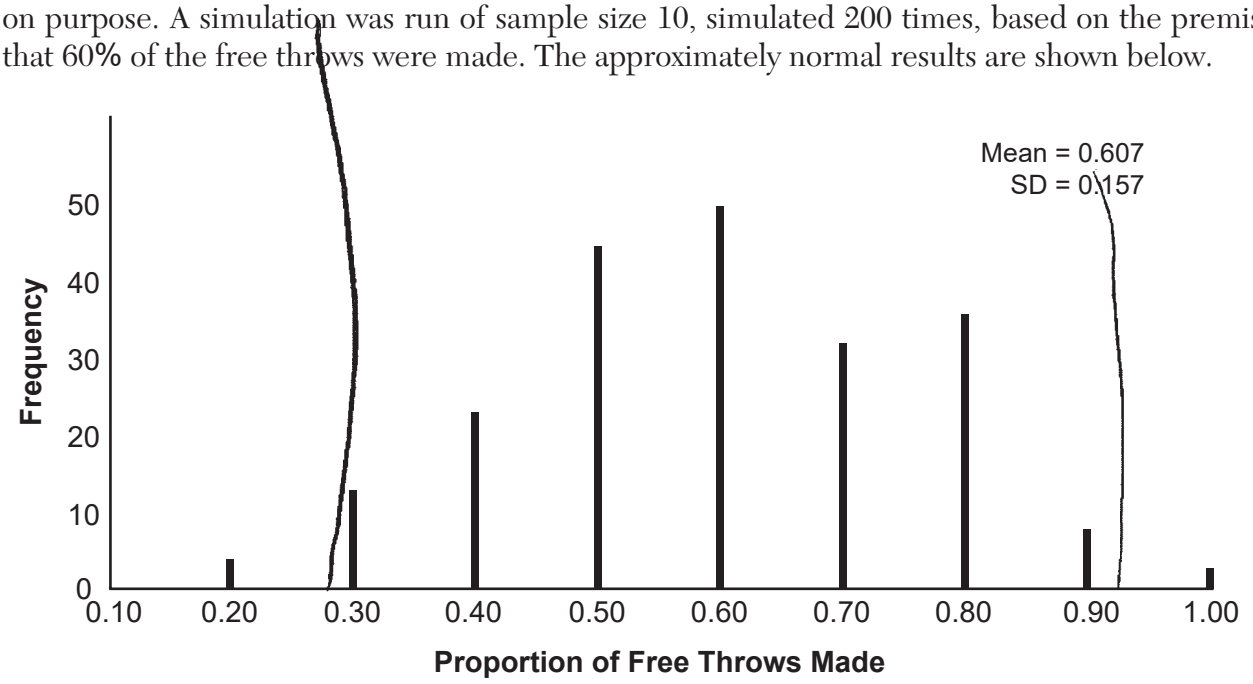
Do the fans have a valid argument? Explain using statistical evidence.

No. The results are within the 95% of expected values, (.3) the data is not significant.

Score 2: The student provided a correct explanation.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.



Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

.609 + 2(.157) = .921
.607 − 2(.157) = .293

Do the fans have a valid argument? Explain using statistical evidence.

Yes because it is unlikely that it is falling out of the 95%.

Score 1: The student did not write an interval and the explanation is incorrect.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.

Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

0.607 ± 0.157
.45 – .76

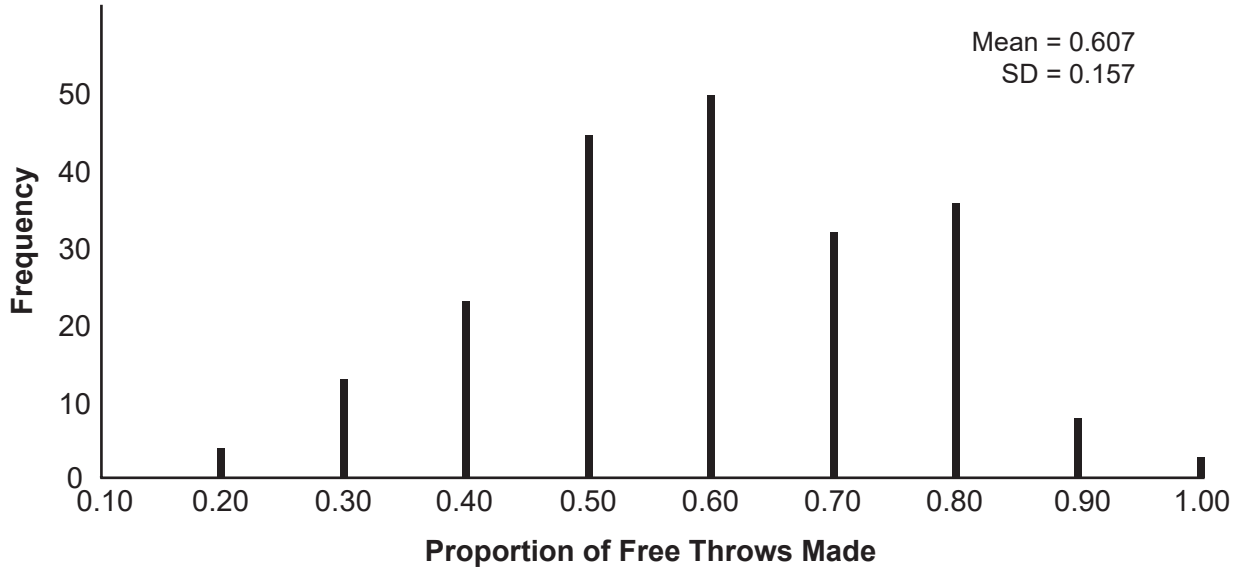
Do the fans have a valid argument? Explain using statistical evidence.

No, 60% is inside the confidence interval, meaning he made what he should've.

Score 1: The student received partial credit for the explanation.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.



Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

2,000

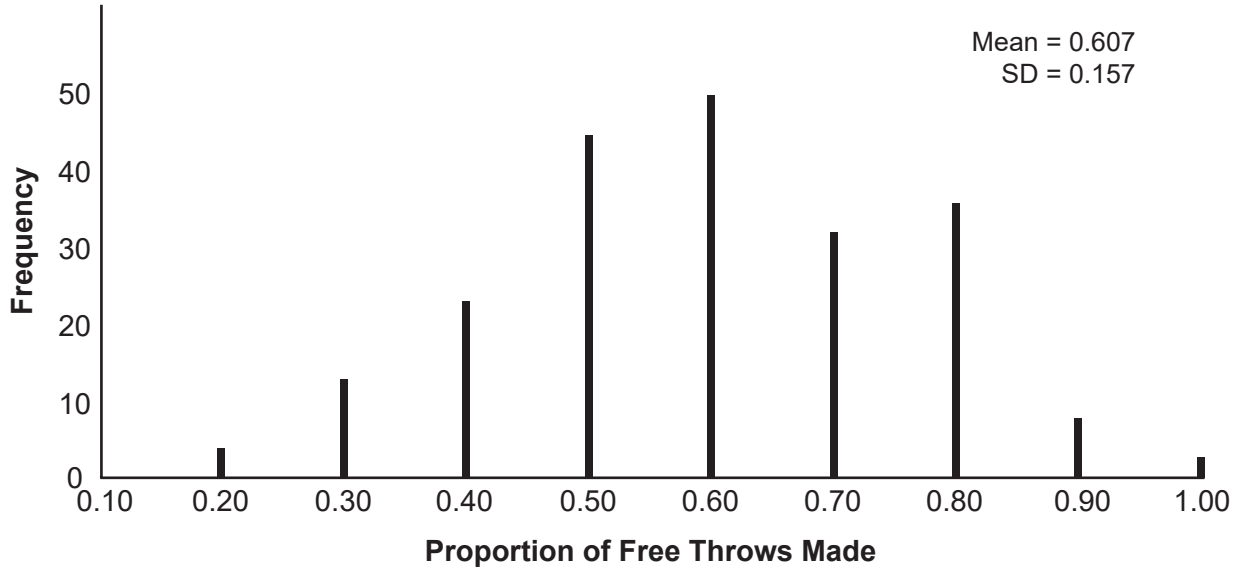
Do the fans have a valid argument? Explain using statistical evidence.

No the fans do not have a valid argument because of the evidence shown in the graph.

Score 0: The student did not satisfy the criteria for one or more credits.

Question 33

33 On a high school basketball team, Alex typically makes 60% of his free throws. In the last four minutes of the game, Alex took 10 free throws and made 30% of them. Fans were saying he missed on purpose. A simulation was run of sample size 10, simulated 200 times, based on the premise that 60% of the free throws were made. The approximately normal results are shown below.



Based on the simulation, determine an interval containing the middle 95% of simulated values. State your answer to three decimal places.

0.60 - 0.70

Do the fans have a valid argument? Explain using statistical evidence.

No since Alex's average isn't that greater than the simulation's

Score 0: The student did not satisfy the criteria for one or more credits.

Question 34

34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

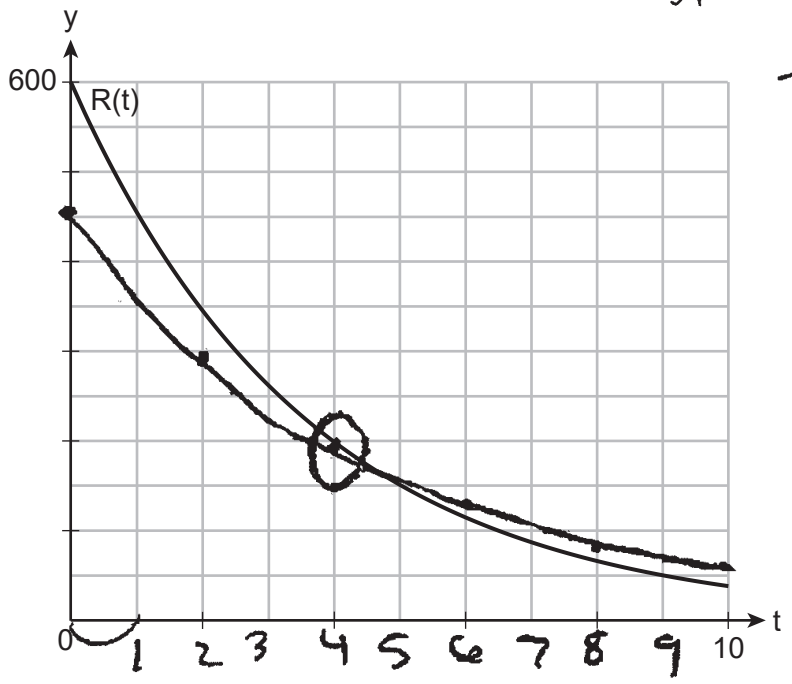
$A(t) = 450e^{-0.205t}$

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.

$y_1 = 450e^{-0.205t}$

x	y
2	298.64
4	198.19
6	131.53
8	87.291
10	57.931



Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

4th hour

Score 4: The student gave a complete and correct response.

Question 34

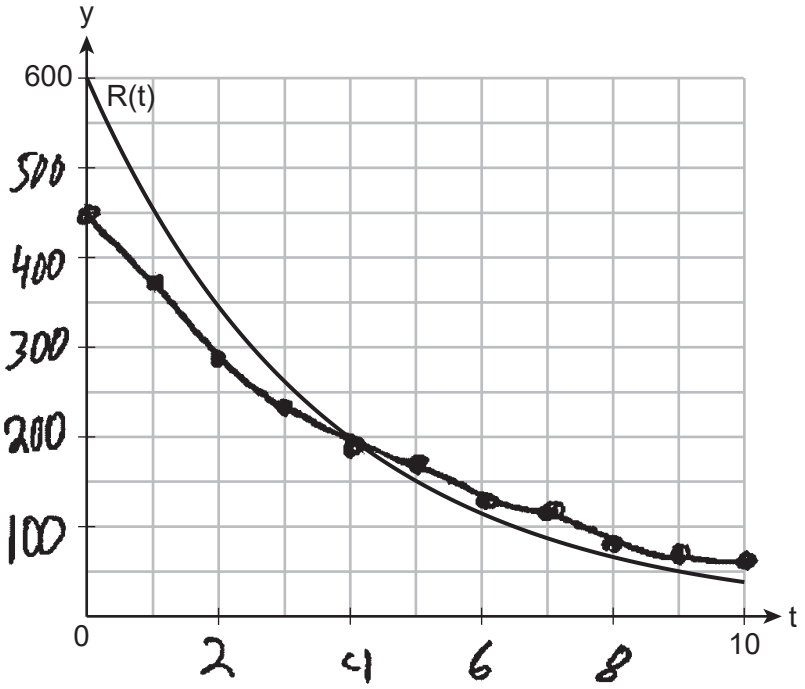
34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

$A_0 = 450$
$r = 0.205$

$A(t) = 450e^{(-0.205)(t)}$

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.



Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

after 4 hours

Score 4: The student gave a complete and correct response.

Question 34

34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

$A(t) = A_0e^{-rt}$

$A(t)$ = amount of drug in body

A_0 = initial dosage

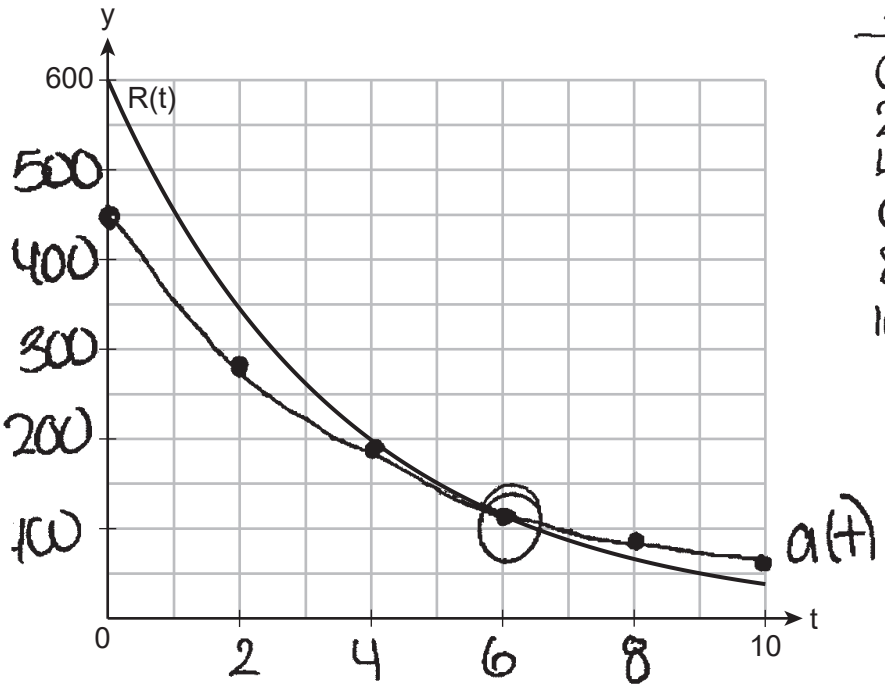
r = rate of decay

t = time (hours)

$A(t) = 450e^{-0.205t}$

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.



t	a(t)
0	450
2	298.6
4	198.2
6	131.5
8	87.3
10	57.9

Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

16 hours

Score 3: The student made one graphing error.

Question 34

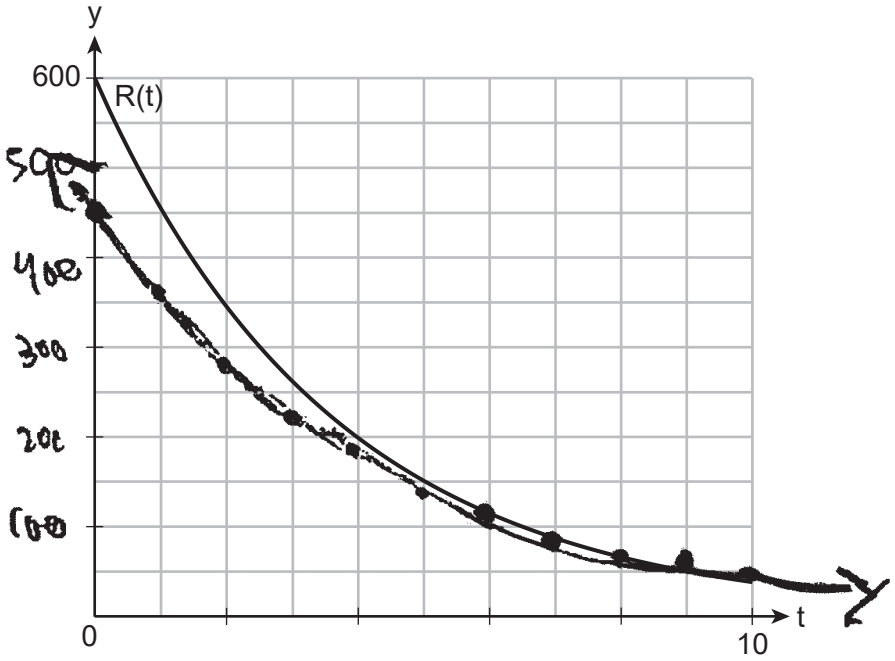
34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

$A(t) = 450(1 - 0.205)^t$

$A(t) = 450(0.795)^t$

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.



Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

I'd say 7th hour

Score 3: The student wrote an incorrect exponential equation.

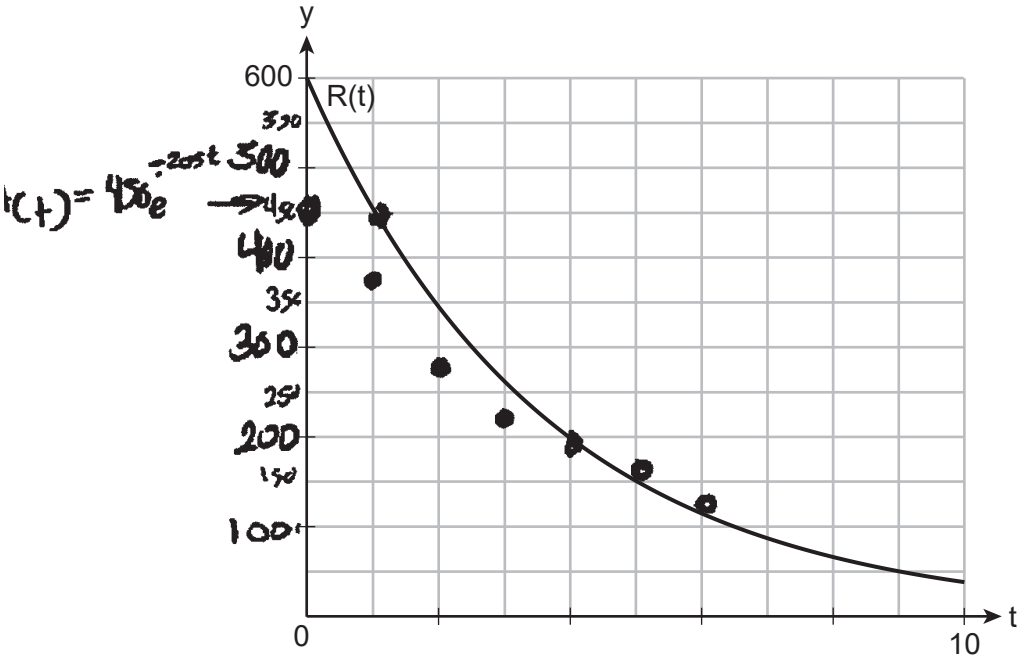
Question 34

34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

$A(t) = 450e^{-0.205t}$

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.



Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

on approximately around the 4th hour, the patient had the same amount of drugs remaining

Score 2: The student made multiple graphing errors.

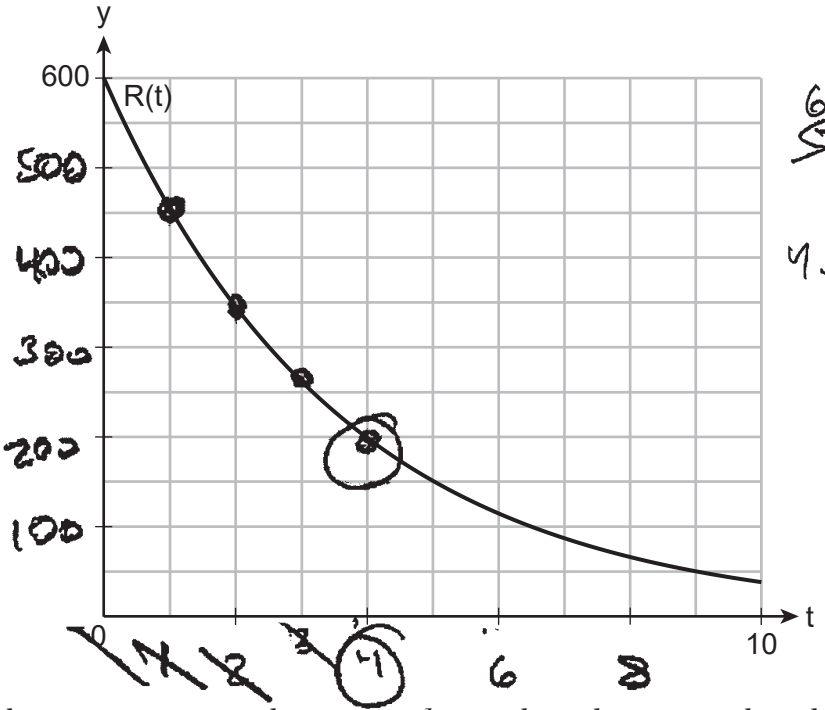
Question 34

34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

$A(t) = 450e^{-.205t}$

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.



600 − 150

450 every hour

Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

$y' = 450e^{-.205t}$

At hour 4 they have the same amount of drug in their body.

X	Y1
0	450
1	366.59
2	298.64
3	243.29
4	198.19

Score 2: The student did not graph $A(t)$.

Question 34

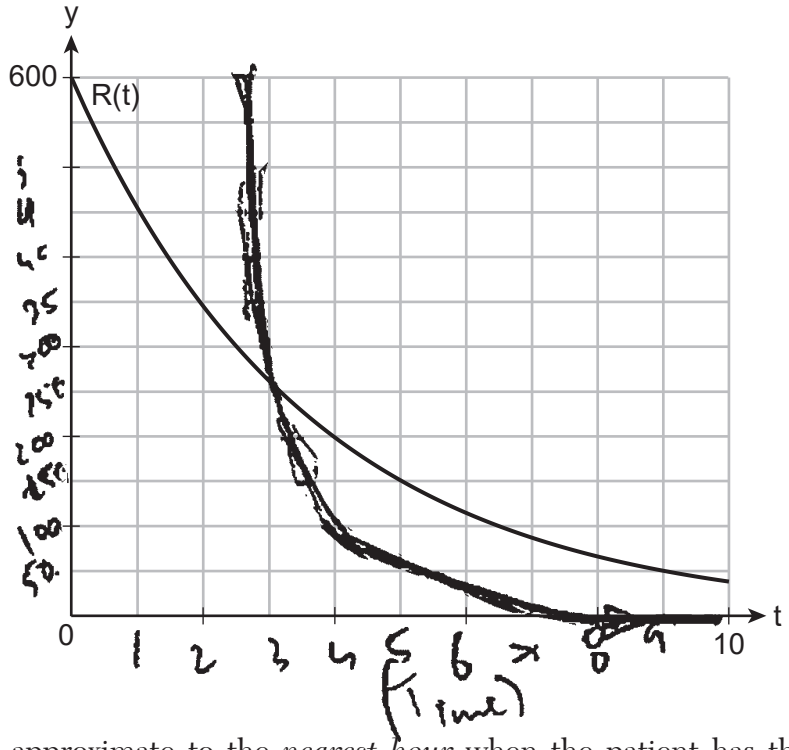
34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

$A(t) = 450e^{-(0.9795)t}$

Amount of drug remaining in the body after t hours is $460e^{-(0.9795)t}$

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.



Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

Approximately 3 hours

Score 1: The student earned full credit on the last part.

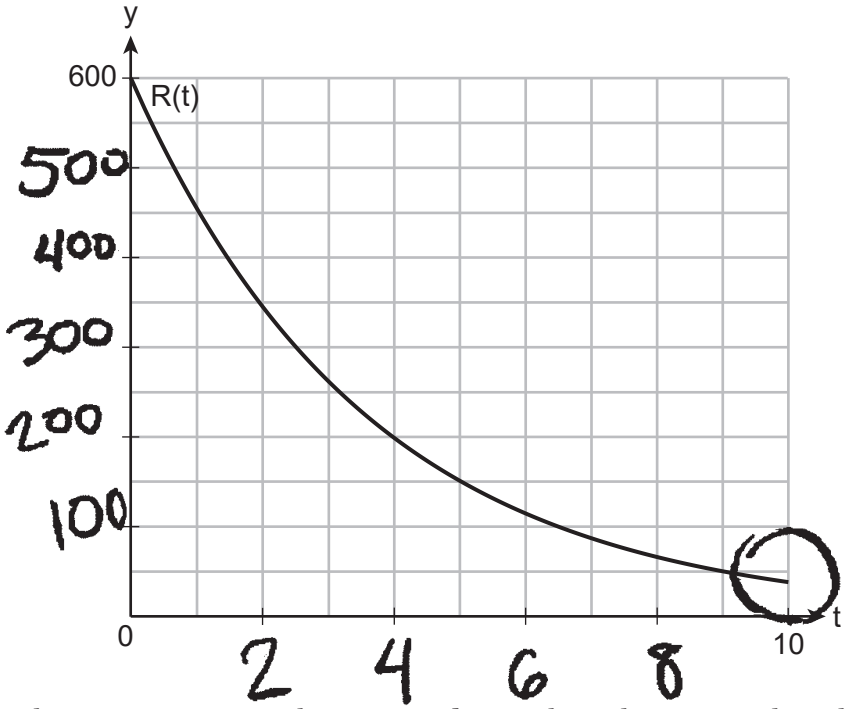
Question 34

34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

$A(t) = 450e^{-(0.205)t}$ Plug into formula

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.



Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

10th hour, the graph begins to level out.

Score 1: The student wrote a correct exponential function.

Question 34

34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

$A(t) = A_0e^{-rt}$ ← rate of decay, time

↑ amount of drug, dosage

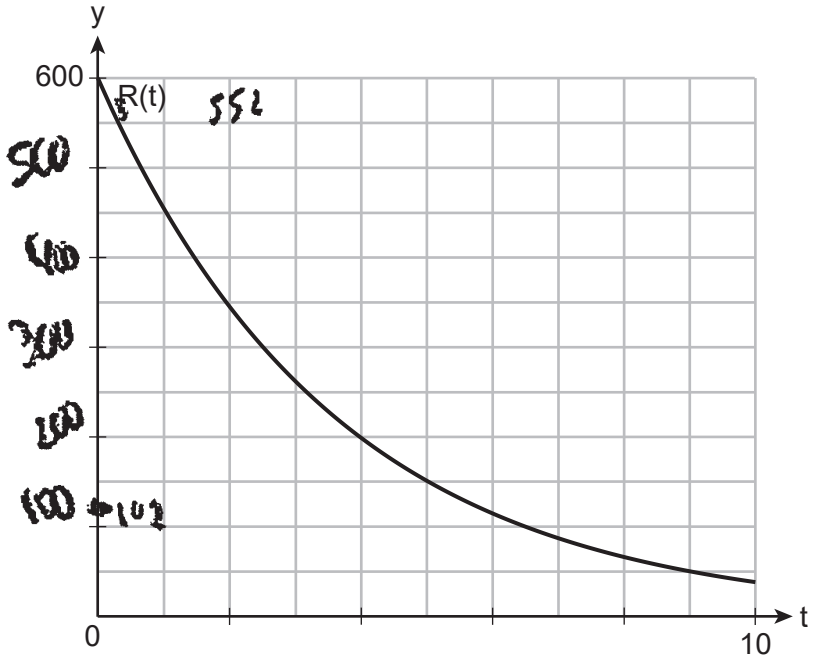
$A(t) = 450e^{-0.205}$

$= 552.38627927$

$A(t) = 552.3$

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.



Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

1 hr 2 min.

Score 0: The student did not satisfy the criteria for one or more credits.

Question 34

34 The breakdown of a drug is modeled by $A(t) = A_0e^{-rt}$, where $A(t)$ is the amount of the drug in the body, A_0 is the initial dosage, r is the rate of decay, and t is the time in hours. A patient is given 450 mg of a drug that has a decay rate of 0.205. Write a function, $A(t)$, to model the amount of the drug remaining in the body after t hours.

$A(t) = A_0e^{-rt}$

$450 = A_0e^{-(0.205)t}$

The sketch below shows the function $R(t)$, which models the breakdown of a different drug administered to the same patient.

Graph $A(t)$ on the grid below.

$A(t) = 450$ mg.

Using the graph, approximate to the *nearest hour* when the patient has the same amount of both drugs remaining.

$450 = A_0e^{-(0.205)t}$.

$450 = A_0e^{-(0.205)4}$.

$450 = A_0e^{-(0.82)}$.

Score 0: The student did not satisfy the criteria for one or more credits.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

$\cos\left(\frac{4}{3}\pi t\right) = 1$

$\frac{4}{3}\pi t = \cos^{-1}(1)$

$\frac{4}{3}\pi t = 0$

$t = 0$

$d(0) = 6800\cos\left(\frac{4}{3}\pi(0)\right) + 6400$

$d(0) = 6800(1) + 6400$

$d(0) = 13200$

State the period of $d(t)$.

$per = \frac{2\pi}{b}$

$per = \frac{2\pi}{4/3\pi}$

$per = 1.5$

Determine the average rate of change from $\frac{3}{4} \le t \le 2$.

$d\left(\frac{3}{4}\right) = 6800\cos\left(\frac{4}{3}\pi\left(\frac{3}{4}\right)\right) + 6400$

$d\left(\frac{3}{4}\right) = 6800(-1) + 6400$

$d\left(\frac{3}{4}\right) = -400$

$d(2) = 6800\cos\left(\frac{4}{3}\pi(2)\right) + 6400$

$d(2) = 3000$

$\frac{f(a)-f(b)}{a-b} = \frac{d(2)-d\left(\frac{3}{4}\right)}{2-\frac{3}{4}}$

$= 2720$

Score 4: The student gave a complete and correct response.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

max = c + a
max = 13,200

a = 6800
c = 6400
b = $\frac{4}{3}\pi$
p = $\frac{2\pi}{\frac{4}{3}\pi}$ = 1.5

State the period of $d(t)$.

p = 1.5

Determine the average rate of change from $\frac{3}{4} \le t \le 2$.

$d(\frac{3}{4}) = 6800\cos(\frac{4}{3}\pi(\frac{3}{4}))+6400$

$d(\frac{3}{4}) = -400$

$d(2) = 3000$

$\frac{3000+400}{2-.75} = 2720$

Score 4: The student gave a complete and correct response.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

$d(0) = 6800\cos\left(\frac{4}{3}\pi(0)\right) + 6400$

$d(0) = 13200$

State the period of $d(t)$.

graph → table →

x	y
-3	13200
-2	3000
-1	3000
0	13200
1	3000
2	3000
3	13200

period → 3

Determine the average rate of change from $\frac{3}{4} \le t \le 2$.

$d\left(\frac{3}{4}\right) = 6800\cos\left(\frac{4}{3}\pi\left(\frac{3}{4}\right)\right) + 6400$

$d\left(\frac{3}{4}\right) = -400$

$d(2) = 6800\cos\left(\frac{4}{3}\pi(2)\right) + 6400$

$d(2) = 3000$

$$\frac{3000 - (-400)}{2 - \frac{3}{4}} = \frac{3400}{1.25} = 2720$$

Score 3: The student did not state a correct period.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

value is 6800 b/c amplitude

State the period of $d(t)$.

$t = \frac{2\pi}{B}$ $\quad t = \frac{2\pi}{(4/3\pi)} = \frac{3}{2}$

Determine the average rate of change from $\frac{3}{4} \leq t \leq 2$.

$2 - 3/4 = \frac{5}{4}$

$d(2) - d(3/4) = 3400$

$3400/(5/4) = 2720$

Score 3: The student wrote an incorrect maximum value.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

d(t) = 6800 cos(4/3π t) + 6400

d(1.5) = 6800 cos(4/3π (-1.5)) + 6400

MAX = 13057

State the period of $d(t)$.

B = 2π/P

(4/3π)/2π = 2π/2π B

2/3 = B

P = 2π/B

P = 2π(4/3π)

Determine the average rate of change from $\frac{3}{4} \leq t \leq 2$. ($x_1$, x_2)

d(t) = 6800 cos(4/3π (3/4)) + 6400

y_1 d(t) = -400

d(t) = 6800 cos(4/3π (2)) + 6400

y_2 d(t) = 3000

$\frac{y_2 - y_1}{x_2 - x_1} = \frac{3000 - -400}{2 - (3/4)} =$

$\frac{3400}{1.25} =$ 2720

Score 2: The student determined the average rate of change correctly.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

6800 + 6400 = 13200

State the period of $d(t)$.

$P = \frac{2\pi}{b}$

$P = \frac{2\pi}{4/3} \cdot \frac{3}{3}$

$P = \frac{6\pi}{4} = 1\frac{2\pi}{2}$

Determine the average rate of change from $\frac{3}{4} \le t \le 2$.

$d(\frac{3}{4}) = 6800\cos(\frac{4}{3}\pi(\frac{3}{4})) + 6400 = -400$ 8000

$d(2) = 6800\cos(\frac{4}{3}\pi(2)) + 6400 =$ ~~6058.245298~~

$(\frac{3}{4}, -400)$

$(2, 3000)$

8000

~~6058.245~~ + 400

$2 - \frac{3}{4}$

$\frac{3400}{1.25} = 2400$

Score 2: The student wrote an incorrect period and made a computational error to determine the average rate of change.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

6400 + 6800

13200

State the period of $d(t)$.

$\frac{2\pi}{\frac{4}{3}}$ $2\pi \cdot \frac{3}{4} = \frac{12}{12} = \frac{3\pi}{4}$

Determine the average rate of change from $\frac{3}{4} \le t \le 2$.

$8000\cos\left(\frac{4}{3}\pi\left(\frac{3}{4}\right)\right) + 6400$

$$\frac{13184.78062 - 13127.44005}{\frac{3}{4} - 2}$$

$$\frac{62.34}{-1.25} = 49.87$$

Score 1: The student stated a correct maximum value.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

13,200

State the period of $d(t)$.

$\frac{4}{3} \cdot \frac{\pi}{2} = 2$

Determine the average rate of change from $\frac{3}{4} \leq t \leq 2$.

$d\left(\frac{3}{4}\right) = 6800\cos\left(\frac{4}{3}\pi\left(\frac{3}{4}\right)\right) + 6400 = -400$

$d(2) = 6800\cos\left(\frac{4}{3}\pi(2)\right) + 6400 = +8000$

2600

$\frac{2600}{2} = 1200$

Score 1: The student stated a correct maximum value.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

$6800\cos\left(\frac{4}{3}\pi 10\right)+6400$

$d(10)=6800\cos\left(\frac{4}{3}\pi t\right)+6400$

$d(10)=11462.22728$

State the period of $d(t)$.

$\cos 6800 = 0.766$

$d(.766) = 6800\cos\left(\frac{4}{3}\pi .766\right)+6400$

$d(.766) = 13189.34$

Determine the average rate of change from $\frac{3}{4} \le t \le 2$.

- $\frac{3}{4}$ less than or = to T
- T is less than or equal to 2

$2-\frac{3}{4}=1.25$

Score 0: The student did not satisfy the criteria for one or more credits.

Question 35

35 Consider the sinusoidal function below.

$$d(t) = 6800\cos\left(\frac{4}{3}\pi t\right) + 6400$$

State the maximum value of $d(t)$.

6800

State the period of $d(t)$.

$\frac{2\pi}{\frac{4}{3}\pi} = 9.8$

Determine the average rate of change from $\frac{3}{4} \leq t \leq 2$.

greater or same as $\frac{3}{4}$ less or same as 2.

Score 0: The student did not satisfy the criteria for one or more credits.

Question 36

36 Solve algebraically for all values of m:

$$m - 2\sqrt{4m - 3} = 3$$

$m - 2\sqrt{4m-3} = 3$

$-m \qquad\qquad -m$

$\frac{-2\sqrt{4m-3}}{-2} = \frac{3-m}{-2}$

$\left(\sqrt{4m-3}\right)^2 = \left(\frac{-3}{2} + \frac{m}{2}\right)^2$

$4m-3 = \left(\frac{-3}{2} + \frac{m}{2}\right)\left(\frac{-3}{2} + \frac{m}{2}\right)$

$(4m-3)\cdot 4 = \left(\frac{9}{4} - \frac{3m}{4} - \frac{3m}{4} + \frac{m^2}{4}\right)\cdot 4$

$16m - 12 = 9 - 6m + m^2$

$-16m + 12$

$0 = m^2 - 22m + 21$

$(m-1)(m-21) = 0$

$m - 1 = 0$ $\qquad$ $m - 21 = 0$

$+1$ $\qquad\qquad$ $+21$

$m = 1$ $\qquad$ $m = 21$

Extraneous solution

– Check –

$m - 2\sqrt{4m-3} = 3$

$1 \to m \quad -1 + 3 \quad$ ✗

$21 \to m \quad 3 = 3 \quad$ ✓

Score 4: The student gave a complete and correct response.

Question 36

36 Solve algebraically for all values of m:

$m - 2\sqrt{4m - 3} = 3$

$-m$

$3 - m = -2\sqrt{4m-3}$

-1

$(-3 + m = 2\sqrt{4m-3})^2$

$(-3+m)(-3+m) = 4(4m-3)$

$9 - 6m + m^2 = 16m - 12$

$-16m + 12$

$m^2 - 22m + 21 = 0$

$1 \to a$

$-22 \to b$

$21 \to c$

$\Delta = b^2 - 4ac = 400$

$\frac{22 \pm \sqrt{400}}{2}$

$m = 21$

~~$m = 1$~~

Check

$21 \to m$

$m - 2\sqrt{4m-3} = 3$

$3 = 3$ ✓

$1 \to m$

$m - 2\sqrt{4m-3} = 3$

$-1 \neq 3$ ✗

Score 4: The student gave a complete and correct response.

Question 36

36 Solve algebraically for all values of m:

$$m - 2\sqrt{4m - 3} = 3$$

$-2\sqrt{4m-3} = 3-m$

$\frac{-2\sqrt{4m-3}}{-2} = \frac{3-m}{-2}$

$\left(\sqrt{4m-3}\right)^2 = \left(\frac{3}{2} - \frac{1}{2}m\right)^2$

$-\frac{3}{2}\left(-\frac{3}{2}-\frac{1}{2}m\right) - \frac{1}{2}m\left(-\frac{3}{2}-\frac{1}{2}m\right)$

$\frac{9}{4} + \frac{3}{4}m + \frac{3}{4}m + \frac{1}{4}m^2$

$4m-3 = \frac{1}{4}m^2 + \frac{3}{2}m + \frac{9}{4}$

$\frac{1}{4}m^2 - \frac{5}{2}m + \frac{21}{4}$

$\frac{1}{4}(m^2 - 10m + 21)$

$\frac{1}{4}(m-7)(m-3) = 0$

$m=7 \quad m=3$

Check

$7 - 2\sqrt{4(7)-3} \stackrel{?}{=} 3$

$-3 \neq 3$

$3 - 2\sqrt{4(3)-3} \stackrel{?}{=} 3$

$-3 \neq 3$

no solutions

Score 3: The student made a computational error when dividing by −2.

Question 36

36 Solve algebraically for all values of m:

$$m - 2\sqrt{4m - 3} = 3$$

$m-2\sqrt{4m-3}=3$

$-2\sqrt{4m-3}=3-m$

$4(4m-3)=9-6m+m^2$

$16m-12=9-6m+m^2$

$16m-12-9+6m-m^2=0$

$(16m+6m)-12-9-m^2=0$

$-m^2+22m-21=0$

$+m^2-m-21m+21=0$

$m(m-1)-21(m-1)=0$

$(m-1)(m-21)=0$

$m-1=0$

$m-21=0$

$m-1=0$

$+1\ \ +1$

$m=1$

$m-21=0$

$+21\ \ +21$

$m=21$

$21-2$

$21-2\sqrt{81}=3$

$21-2\cdot 9=3$

1

Score 3: The student did not reject the extraneous root.

Question 36

36 Solve algebraically for all values of m:

$$m - 2\sqrt{4m - 3} = 3$$

$m = 2\sqrt{4m-3} + 3$

$m - 3 = 2\sqrt{4m-3}$

$(m-3)(m-3)$ $\left(\frac{m-3}{2}\right)^2 = \left(\sqrt{4m-3}\right)^2$

$\frac{(m-3)^2}{(2)^2} = 4m - 3$

$\frac{m^2-6m+9}{4} = 4m - 3$

$\frac{m^2-6m+21}{4} = 4m$

$m^2 - 6m + 21 = 16m$

$m^2 - 22m + 21 = 0$

$(m-21)(m-1)$

$m = \{21, 1\}$

Score 2: The student solutions are incorrect and were not rejected.

Question 36

36 Solve algebraically for all values of m:

$$m - 2\sqrt{4m - 3} = 3$$

$-m \quad -m$

$$\frac{-2\sqrt{4m-3}}{-2} = \frac{-m+3}{-2}$$

$$\left(\sqrt{4m-3}\right)^2 = \left(\frac{1}{2}m + \frac{3}{2}\right)^2$$

$$\left(\tfrac{1}{2}m - \tfrac{3}{2}\right)\left(\tfrac{1}{2}m - \tfrac{3}{2}\right)$$

$$4m - 3 = \frac{1}{4}m^2 - \frac{6}{4}m + \frac{9}{4}$$

$-4m \quad -3 \qquad\qquad -4m \quad -3$

$$\frac{1}{4}m^2 - \frac{22}{4} - \frac{3}{4} = 0$$

$$x = \frac{\frac{22}{4} \pm \sqrt{\left(-\frac{22}{4}\right)^2 - 4\left(\frac{1}{4}\right)\left(-\frac{3}{4}\right)}}{2\left(\frac{1}{4}\right)}$$

$$x = \frac{\frac{22}{4} \pm \sqrt{31}}{\frac{2}{4}}$$

$$\left\{11 \pm \frac{2}{4}\sqrt{31}\right\} \qquad 11 \pm \frac{2}{4}\sqrt{31}$$

Score 1: The student received one credit for correctly squaring both sides.

Question 36

36 Solve algebraically for all values of m:

$$m - 2\sqrt{4m - 3} = 3$$

$m - 2\sqrt{4m-3} = 3$

$-m+2 \quad -m+2$

$(\sqrt{4m-3})^2 = (m+5)^2$

$4m-3 = (-m+5)(-m+5)$

$4m-3 = m^2-5m-5m+25$

$4m-3 = m^2-10m+25$

$-4m+3 \quad -4m+3$

$0 = m^2-16m+28$

$(m-14)(m-2) = 0$

$m = 14$

$m = 2$

Score 1: The student made a conceptual error and one computational error.

Question 36

36 Solve algebraically for all values of m:

$$m - 2\sqrt{4m - 3} = 3$$

$m-2\sqrt{4m-3}=3$
$-m+2 \qquad -m+2$

$\sqrt{4m-3}=3-m+2$

$\sqrt{4m-3}^2=5-m^2$

$4m-3=(5-m)(5-m)$

$4m-3=25-5m-5m+m^2$

$4m-3=m^2-10m+25$
$-4 \quad +3 \qquad +3$

$4m=m^2-10m+27$
$+10m \qquad +10m$

$14m=m^2+27$
$-14m \qquad -14m$

$a \quad b \quad c$
$m^2-14m+27$

$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$x=\frac{-(14)\pm\sqrt{(-14)^2-4(1)(27}}{2(1)}$

$x=\frac{14\pm\sqrt{196-108}}{2}$

$x=\frac{14\pm\sqrt{88}}{2}$

$x=\frac{14\pm2\sqrt{44}}{2}$

$x=7\pm2\sqrt{44}$

CV

$x=7+2\sqrt{44}$

88
2 | 44
4 | 22
8 | 11

Score 0: The student did not satisfy the criteria for one or more credits.

Question 36

36 Solve algebraically for all values of m:

$m - 2\sqrt{4m - 3} = 3$

$-m \qquad\qquad = -m$

$\frac{-2\sqrt{4m-3}}{-2} \quad \frac{3-m}{-2}$

$(\sqrt{4m-3})^2 = (\frac{3-m}{-2})^2$

$\frac{4m-3}{1} = \frac{2(3-m)}{-4}$

$\frac{2(3-m)}{2} = \frac{-4(4m-3)}{2}$

$3-m = -2(4m-3$

$3-m = -8m+6$

$-6 \qquad\quad -6$

$-3-m = -8m$

$+m \quad +m$

$\frac{-3}{-7} = \frac{-7m}{-7}$

$m = \frac{3}{7}$

Score 0: The student's response does not contain enough course-level work to receive any credit.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

$d=5$

$r=1.15$

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander's plan can be modeled using an arithmetic sequence because his plan is characterized by a common difference each day. Yvette's plan can be modeled by a geometric sequence, because her plan is characterized by a common ratio.

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

$x_n = 15 + 5(n-1)$

$x_n = 5n + 10$

$y_n = 10 \cdot 1.15^{n-1}$

$y_n = 10(1.15)^{n-1}$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

$x_{19} = 5(19) + 10$

$x_{19} = 105$

$y_{19} = 10 \cdot 1.15^{18}$

$y_{19} = 123.75$

Yvette

Score 6: The student gave a complete and correct response.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander's plan can be modeled by an arithmetic sequence because the time is incremented by 5 minutes whereas Yvette's plan can be modeled by a geometric sequence because her time is multiplied by 1.15 each day.

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

$$x_n = 15 + (n-1)5$$

$$y_n = 10(1.15)^{n-1}$$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

$x_{19} = 15 + (19-1)5 = 105$ minutes

$y_{19} = 10(1.15)^{19-1} \approx 124$ minutes

Yvette will spend more time driving on the 19th day

Score 6: The student gave a complete and correct response.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander can be modeled by an arithmetic sequence. because it add 5 minutes each day.
Yvette can be modeled by a Geometric sequence because it multiply the amount of 15% which is 0.15, then add 1 to get the rate. The rate multiply previous number to get next number.

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

Xander:

$x_n = 15 + 5(n-1)$

Yvette:

$y_n = 10(1.15)^{n-1}$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

Xander:

$x_{19} = 15 + 5(19-1)$
$= 15 + 105$
$= 120$

Yvette:

$y_{19} = 10(1.15)^{19-1}$
$= 10(1.15)^{18}$
≈ 123.75

Yvette speed more time with 123.75 minute on the 19th day of practicing.

Score 5: The student made a computational error calculating Xander's time in the last part.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander's plan can be modeled by an arithmetic sequence because it is increasing with addition by a fixed number. Yvette's plan can be modeled by a geometric sequence, as it is increasing with multiplication by a not set number.

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

$x_n = x_1 + (n-1)d$

$x_n = 15 + (n-1)5$

$y_n = y_1 \cdot r^{n-1}$

$y_n = 10 \cdot 1.15^{n-1}$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

$x_{19} = 15 + (19-1)5$

$x_{19} = 105$ mins

$y_{19} = 10 \cdot 1.15^{(19-1)}$

$y_{19} \approx 123.754536$ mins

≈ 124 mins

$124 > 105$

Yvette, she will spend approximately 19 more minutes practicing than Xander.

Score 5: The student gave an incomplete explanation for Yvette in the first part.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander's time can be modeled as a arithmetic sequence because it have a common difference.

Yvette's time can be modeled as a geometric sequence because it has a common ratio

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

$X_n = 15 + 5(n)$

$Y_n = 10(1.15)^n$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

$X_{19} = 15 + 5(19)$ $\quad X_{19} = 110$

$Y_{19} = 10(1.15)^{19}$ $\quad Y_{19} = 142.31$

Score 4: The student used n instead of $n - 1$ in the second part and did not answer the question in the third part.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander's plan can be modeled by an arithmetic sequence since he's adding the same number of minutes each time. Yvette's plan can be modeled by a geometric sequence since her time is multiplying by a percent.

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

$x_n = 15 + (n-1)(5)$

$y_n = 10(1.15)^{n-1}$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

Xander will.

Score 4: The student received no credit on the third part.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander can be modeled by arithmetic sequence as there is a given number to add by

Yvette can be modeled by geometric sequence as her time increases by percentage so to get a number have to multiply the percentage

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

Xander: $15 + (n-1)5$ (day)

Yvette: $10 \cdot .15^{n-1}$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

Xander: $15 + (5)18 = 105$

Yvette: $10 \cdot .15^{18} = 82$

$a_2 = 11.5$

Xander as he has the higher number

Score 3: The student received two points in the first part and one point in the third part.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

– Xander's plan can be modeled as arithmetic sequence since he is increasing the amount of time by 5 minutes.

– Yvette's plan can be modeled as geometric sequence.

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

$x_n = a_1 + d(n-1)$

$15 + 5(n-1)$

$y_n = a_1 r^{n-1}$

$10 r^{n-1}$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

$x_n = 15 + 5(19-1)$

$= 105$

$y_n = 10$

Score 2: The student received one credit on the first part for Xander's explanation and one credit on the second part.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander 105

Xander's can be modeled using an arithmetic sequence b/c it's adding 5 every day.
Yvette can be a geometric b/c it's going up by a 5% each time

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

$15 + 5(x_n)$
$10 + .15(y_n)$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

Yvette will be higher.

Score 1: The student received one credit on the first part.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander is arithmetic sequence

Yvette is geometric sequence

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

$X_n = 15 + (n-1)5$

$Y_n = 10(.15)^{n-1}$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

Yvette will spend more time driving

Score 1: The student received one credit on the second part.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander's plan can be modeled by a geometric sequence because he only uses numbers.
Yvette's plan can be modeled by an arithmetic sequence because she uses percentages.

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

$x_n(15+5)$

$y_n(10+15\%)$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

$\frac{a}{10} = \frac{15}{100}$

$100a = 15 \cdot 10$

$\frac{100a}{100} = \frac{150}{100}$

$a = 1.5$

X: $19(15+5) = 380\text{min}$ Xander

Y: $19(10+15\%)$

$19(10+1.5) = 218.5\text{min}$

Score 0: The student did not satisfy the criteria for one or more credits.

Question 37

37 Xander and Yvette are each practicing for their road tests. Xander decides to drive for 15 minutes the first day and plans to increase the amount of time he spends driving by five minutes each day leading up to the day of his test. Yvette decides to drive for 10 minutes the first day, and she plans to increase the amount of time she spends driving by 15% each day leading up to the day of her test.

State whose plan for the amount of time driving per day can be modeled by an arithmetic sequence, and whose plan can be modeled by a geometric sequence. Explain your reasoning.

Xander's can be modeled by the geometric bc it's more simple than Yvettes

Write an equation for x_n that represents the amount of time spent driving on the nth day for Xander's plan and an equation for y_n that represents the amount of time spent driving on the nth day for Yvette's plan.

Xander

$n = x + 5$

Yvette

$n = n(15\%)$

Who will spend more time driving on the 19th day of practicing? Justify your answer.

xander

1 - 15
2 - 20
3 - 25
4 - 30
5 - 35
6 - 40
7 - 45
8 - 50
9 - 55
10 - 60
11 - 65
12 - 70
13 - 75
14 - 80
15 - 85
16 - 90
17 - 95
18 - 100
19 - 105

Yvette

1 - 10
2 - 11.5
3 - 13.22
4 -
5 -
6 -
7 -
8 -
9 -
10 -
11 -
12 -
13 -
14 -
15 -
16 -
17 -
18 -
19 -

Score 0: The student did not satisfy the criteria for one or more credits.