The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA II

Tuesday, August 19, 2025 — 12:30 to 3:30 p.m., only

MODEL RESPONSE SET

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25 Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

		H	J	
		Hoodie	**Jacket**	
B	**Back**	45	15	60
F	**Front**	27	13	40
		72	28	100

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

$$P(H|B) = \frac{P(H \text{ and } B)}{P(B)}$$

$$P(H|B) = \frac{.45}{.6}$$

$$P(H|B) = 0.75 = \frac{3}{4}$$

$$\boxed{P(H|B) = \frac{3}{4}}$$

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

Question 25

25 Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

	Hoodie	Jacket	
Back	45	15	60
Front	27	13	40
	72	28	

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

$$\frac{45}{60}$$

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

Question 25

25 Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

	Hoodie	Jacket
Back	45	15
Front	27	13

72

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

$$\frac{45}{72} = .625 \rightarrow \boxed{62.5\%}$$

Score 1: The student determined an incorrect conditional probability.

Question 25

25 Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

	Hoodie	Jacket
Back	45	15
Front	27	13

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

45 / (45 + 15 + 27 + 13)

45/100

45% probability

Score 1: The student did not determine a conditional probability.

Question 25

25 Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

	Hoodie	Jacket
Back	45	15
Front	27	13

77

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

$\frac{45}{77} = .58441584 4$

Score 0: The student made multiple errors.

Question 25

25 Seniors at a high school were surveyed to see if they preferred a hoodie or a jacket for Spirit Day and if they wanted a design on the back or the front. The survey results are summarized in the table below.

	Hoodie	Jacket
Back	45	15
Front	27	13

Determine the exact probability that a randomly selected senior from the survey preferred a hoodie, given that the senior wanted a design on the back.

$45 + 15 = 60$ $\quad$ $45 + 27 = 72$

$27 + 13 = 40$ $\quad$ $15 + 13 = \cancel{+28}\ 28$

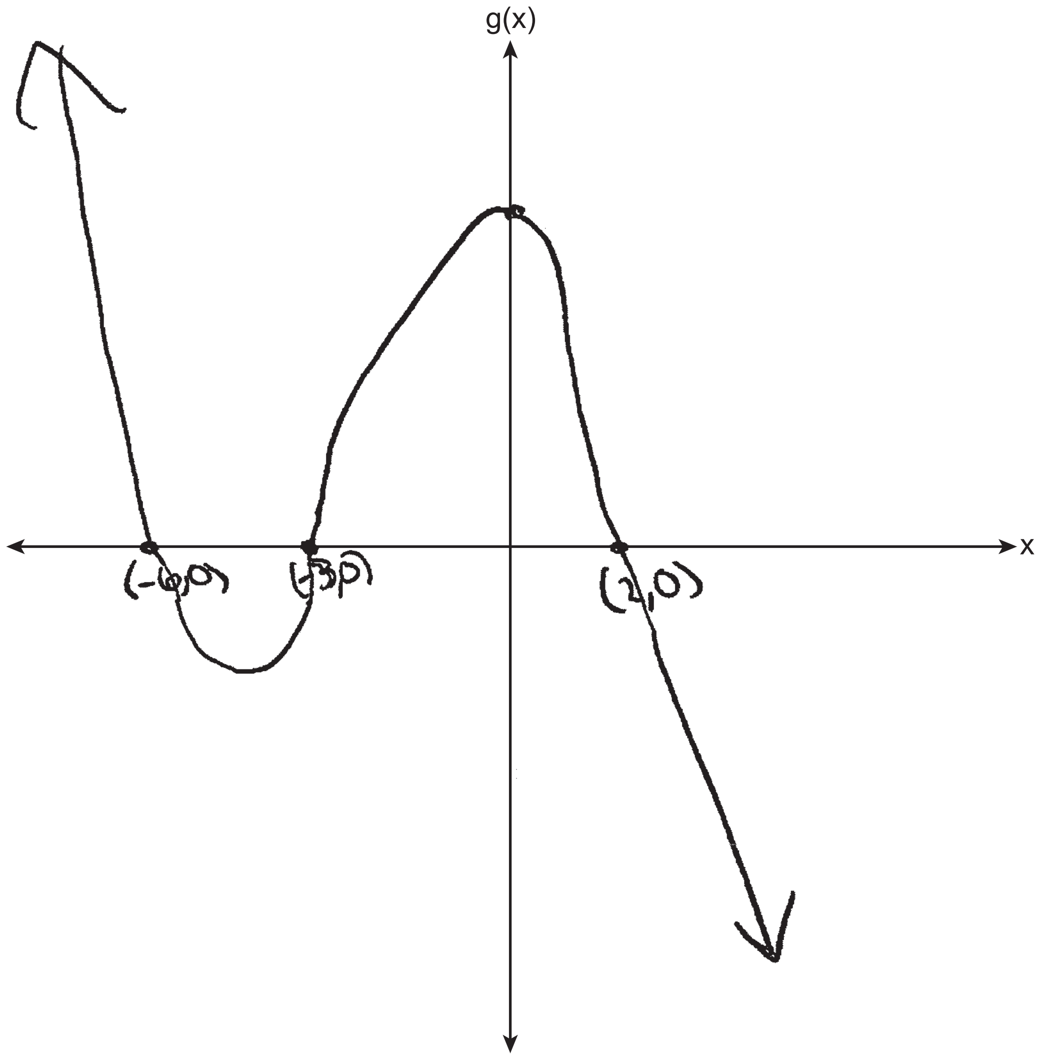
$\overline{100}$ $\quad$ $\overline{100}$

The exact probobility of the hoodie is 100

Score 0: The student response did not show enough relevant course-level work to receive any credit.

Question 26

26 Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.

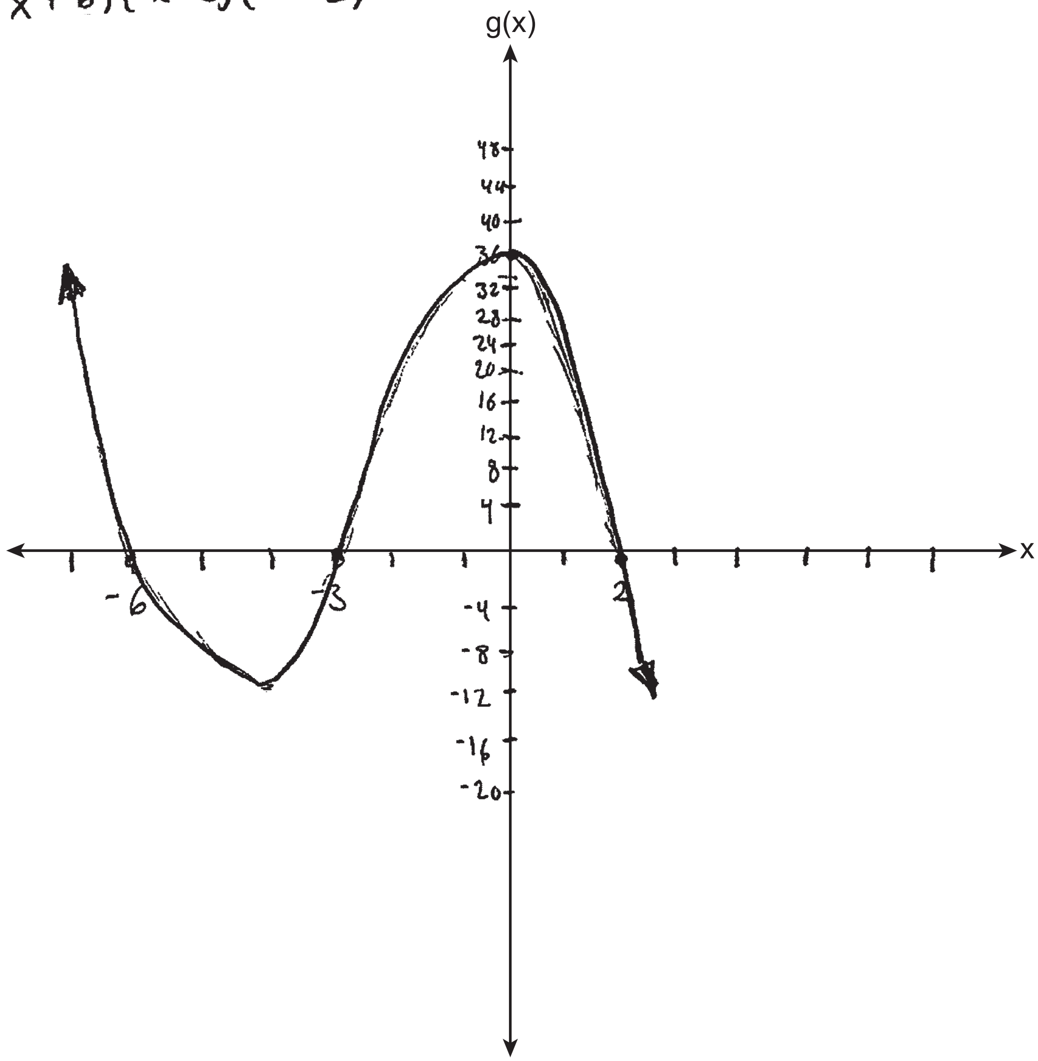


Score 2: The student gave a complete and correct response.

Question 26

26 Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.

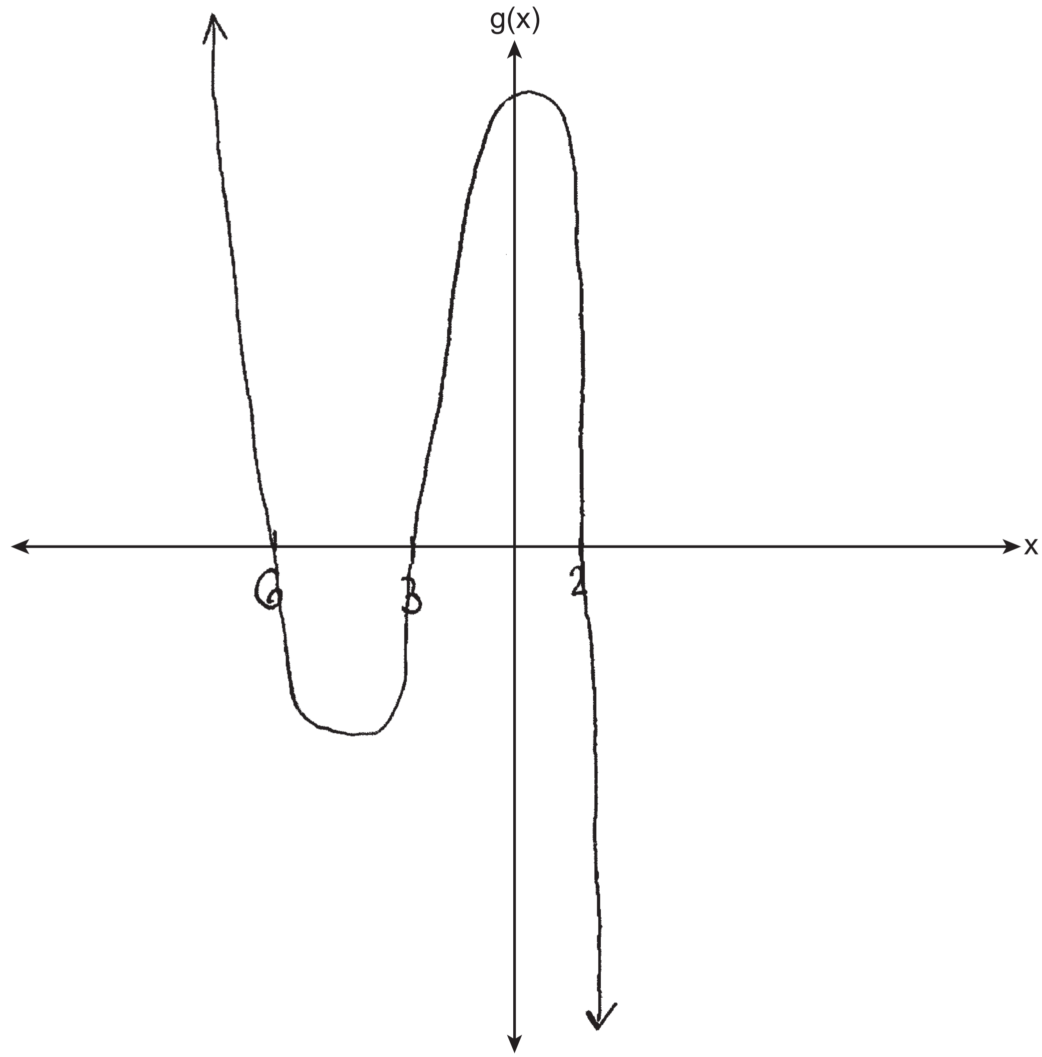
$(x+6)(x+3)(x-2)$



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

Question 26

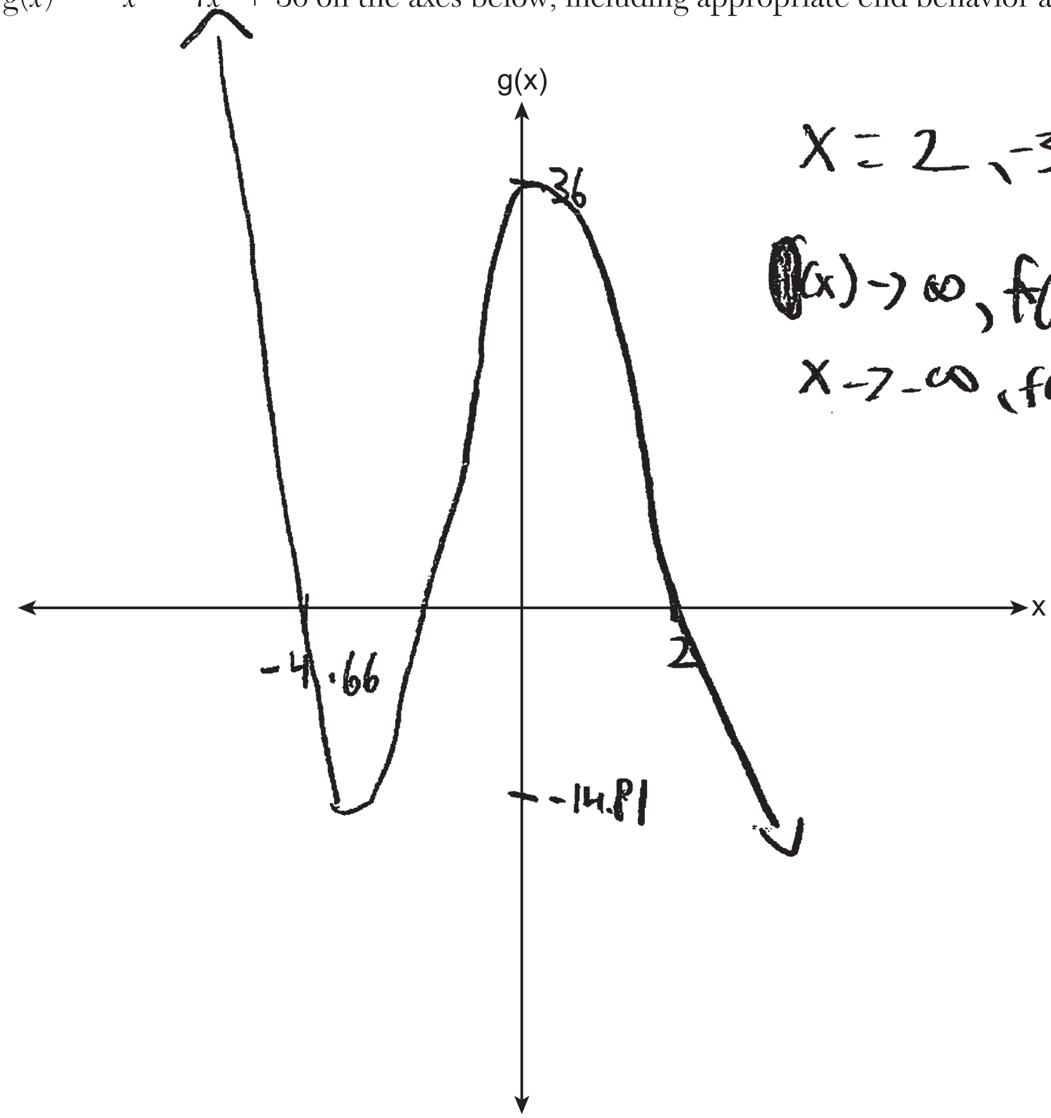
26 Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.



Score 1: The student incorrectly labeled the x-axis.

Question 26

26 Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.



$x = 2, -3, -6$

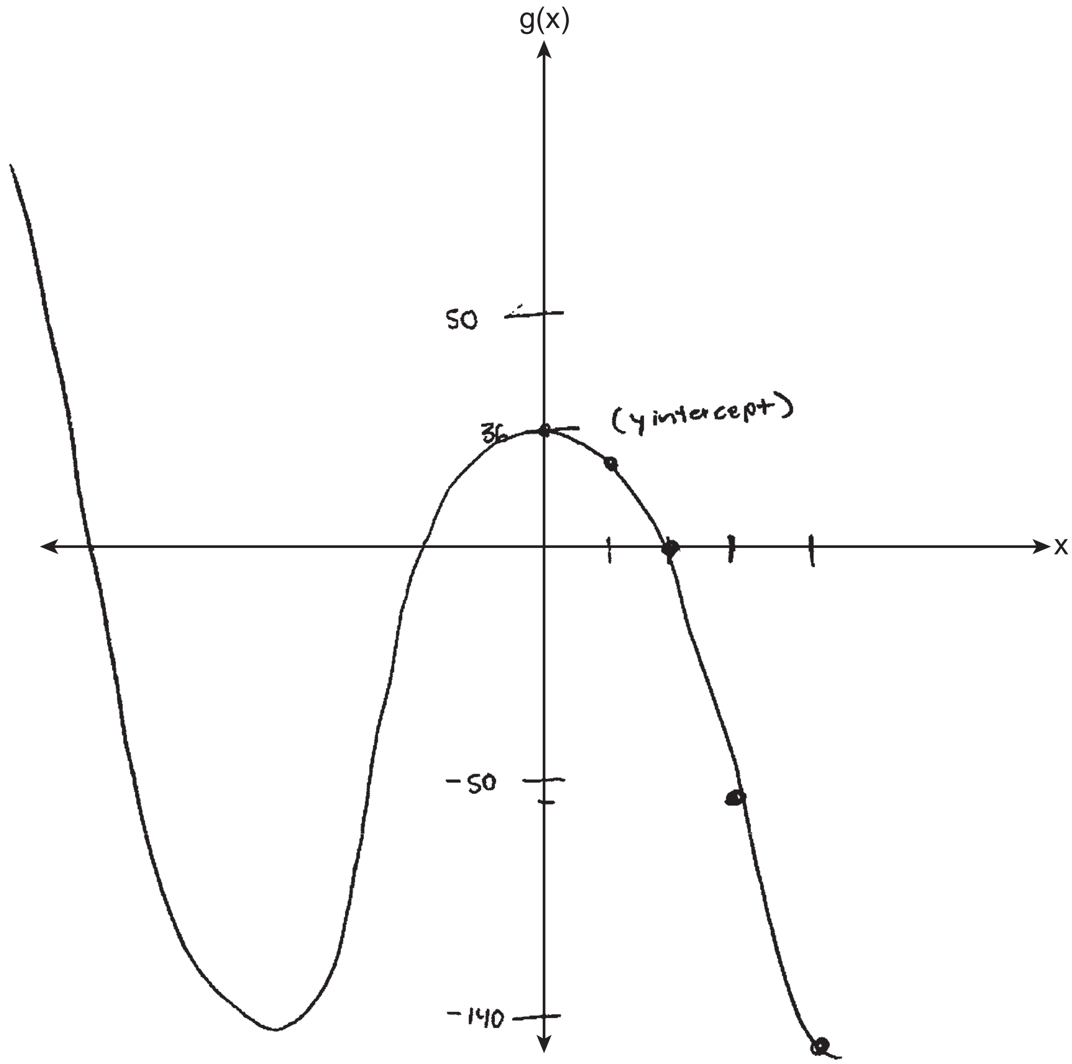
$f(x) \to \infty$, $f(x) \to -$

$x \to -\infty$, $f(x) \to \infty$

Score 1: The student indicated an incorrect x-intercept.

Question 26

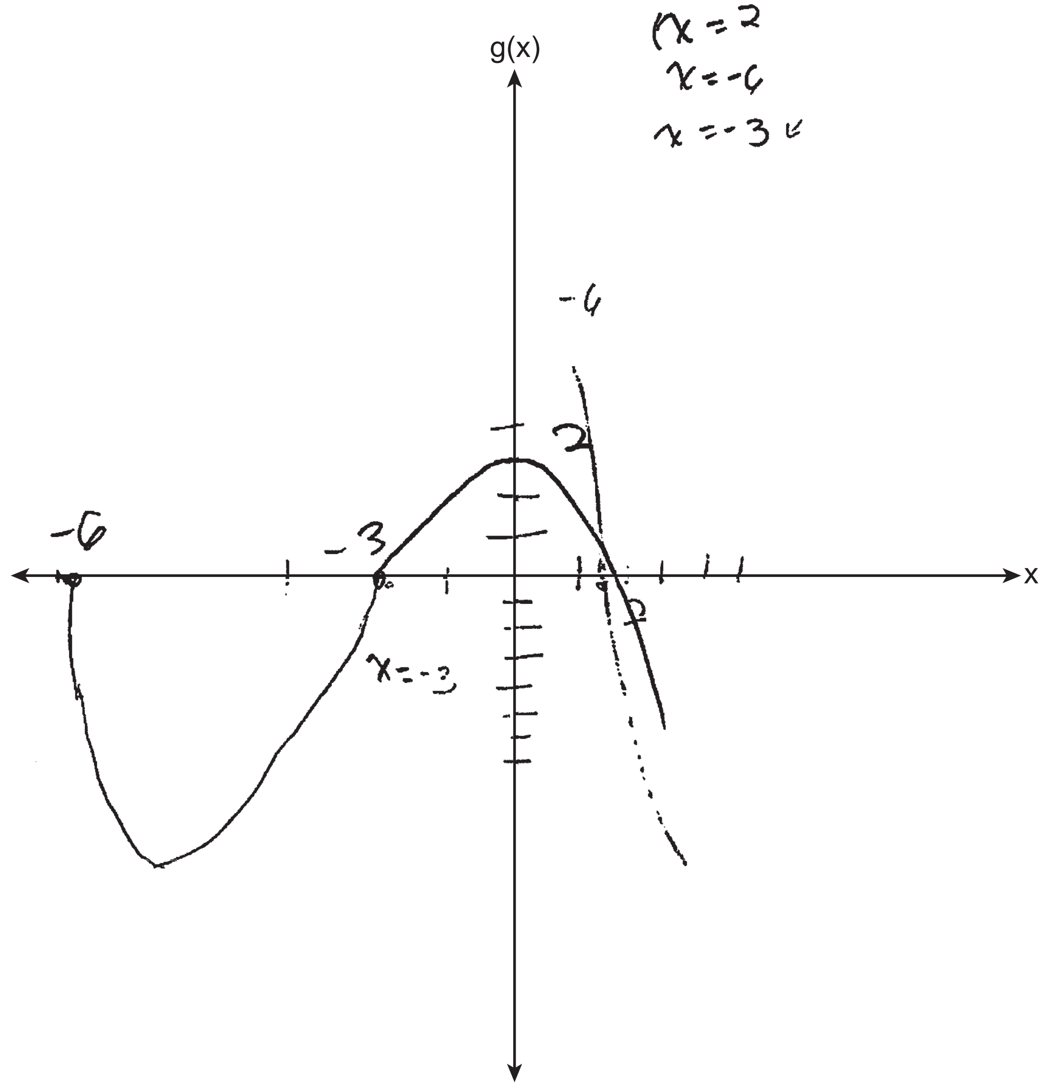
26 Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.



Score 0: The student made more than one graphing error.

Question 26

26 Sketch $g(x) = -x^3 - 7x^2 + 36$ on the axes below, including appropriate end behavior and zeros.



Score 0: The student made more than one graphing error.

Question 27

27 Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where i is the imaginary unit.

$8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$

$(1)8xi^2 - (1)4yi^3 + 2yi^3 - 6xi$

$8x(-1) - 4y(-i) + 2y(-i) - 6xi$

$-8x + 4yi - 2yi - 6xi$

$-8x + 2yi - 6xi$

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

Question 27

27 Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where i is the imaginary unit.

$-8x + 4yi - 2yi - 6xi$

$-8x + 2yi - 6xi$

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

Question 27

27 Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where i is the imaginary unit.

$8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$

$8x(-1) - 4y(1) + 2y(-i) - 6xi$

$-8x - 4y - 2yi - 6xi$

Score 1: The student made one error.

Question 27

27 Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where i is the imaginary unit.

$8x(-1) - 4y(-i) + 2y(-i) - 6xi$

$\cancel{-8x + 4yi - 6xi}$

$-8x + 4yi - 2yi + 6xi$

$-8x + 2yi + 6xi$

Score 1: The student made one transcription error.

Question 27

27 Express $8xi^{10} - 4yi^{19} + 2yi^3 - 6xi$ in simplest form, where i is the imaginary unit.

$\sqrt{16}$ $\sqrt{3}$
4

$(8xi^{10} - 4yi^{19})(+2yi^3 - 6xi)$

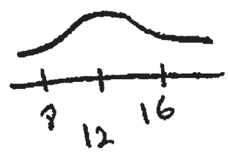
$-8x - i$

$-8x + 4y - 2y + 6x$

$-2x + 2y$

Score 0: The student made multiple errors.

28 The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.



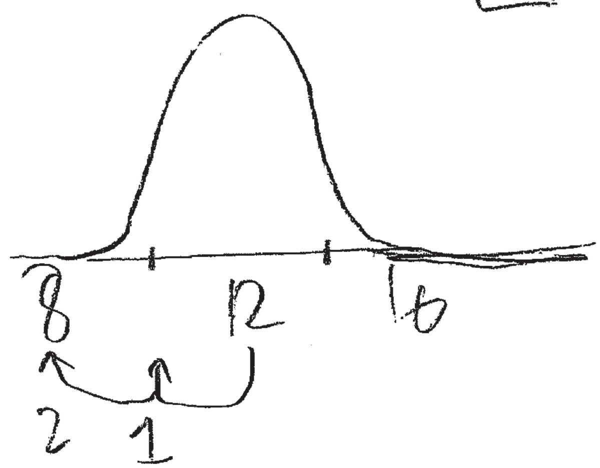
The sd is 2. The interval is just $\bar{x} \pm 2(sd)$, so if you take the $\bar{x}$, and subtract it by the lower data point, then /2 you get the sd. $12-8=4$. $4/2=2$.

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

Question 28

28 The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

$\boxed{2}$



normalcdf(8,16,12,2) = 95%

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

Question 28

28 The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

Standard deviation is 2

$12-2-2=8$

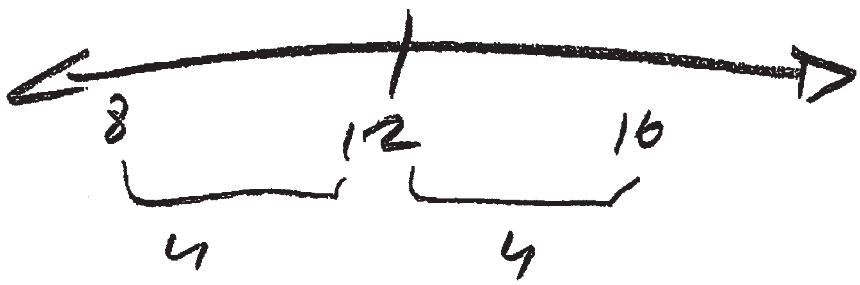
$12+2+2=16$

$8-16=95\%$

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

Question 28

28 The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

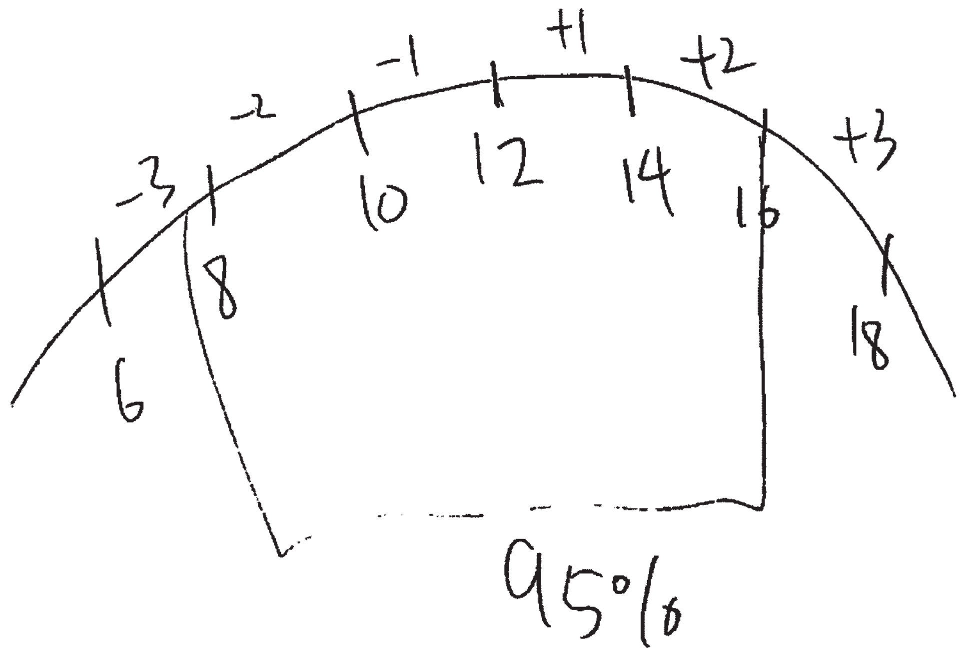


SD = 4 , because thats the difference between the 95% scores and the mean.

Score 1: The student found the margin of error.

Question 28

28 The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.



the standard of deviation will be ± 2

Score 1: The student incorrectly stated the standard deviation.

Question 28

28 The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

It means the other 5% of scores are either higher or lower than the range of 8-16. This is justified because the mean of those 2 numbers is 12 and if 95% of the scores are around there, then there has to be 5% that arent.

Score 0: The student did not show enough relevant course-level work to receive any credit.

Question 28

28 The job satisfaction rating at a company is approximately normally distributed with a mean of 12. About 95% of the scores are between 8 and 16. What is the standard deviation of this distribution? Justify your answer.

12(.95)

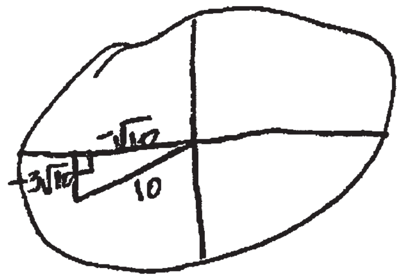
11.4 = Standard deviation

because its the range around the mean

Score 0: The student did not show enough relevant course-level work to receive any credit.

Question 29

29 An angle, θ, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of $\tan\theta$.



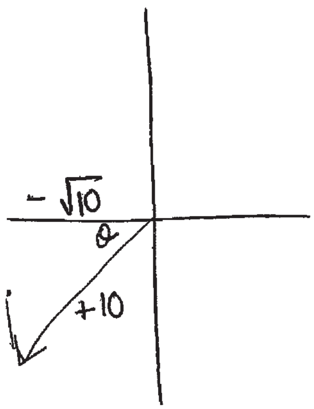
$$a^2 + (-\sqrt{10})^2 = 10^2$$
$$a^2 + 10 = 100$$
$$-10 \quad -10$$
$$\sqrt{a^2} = \sqrt{90}$$
$$a = \sqrt{9}\sqrt{10}$$
$$a = 3\sqrt{10}$$

$$\frac{-3\sqrt{10}}{-\sqrt{10}} = \frac{3\cancel{\sqrt{10}}}{\cancel{\sqrt{10}}} \quad \tan\theta = 3$$

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

Question 29

29 An angle, θ, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of $\tan\theta$.



$x^2 + \sqrt{10}^2 = 10^2$

$x^2 + 10 = 100$

$-10 \quad -10$

$\sqrt{x^2} = \sqrt{90}$

$x = \sqrt{9}\sqrt{10}$

$x = 3\sqrt{10}$

$\frac{-3\sqrt{10}}{-\sqrt{10}} \rightarrow \frac{3\cancel{\sqrt{10}}}{\cancel{\sqrt{10}}} \rightarrow 3$

$\tan\theta = 3$

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

Question 29

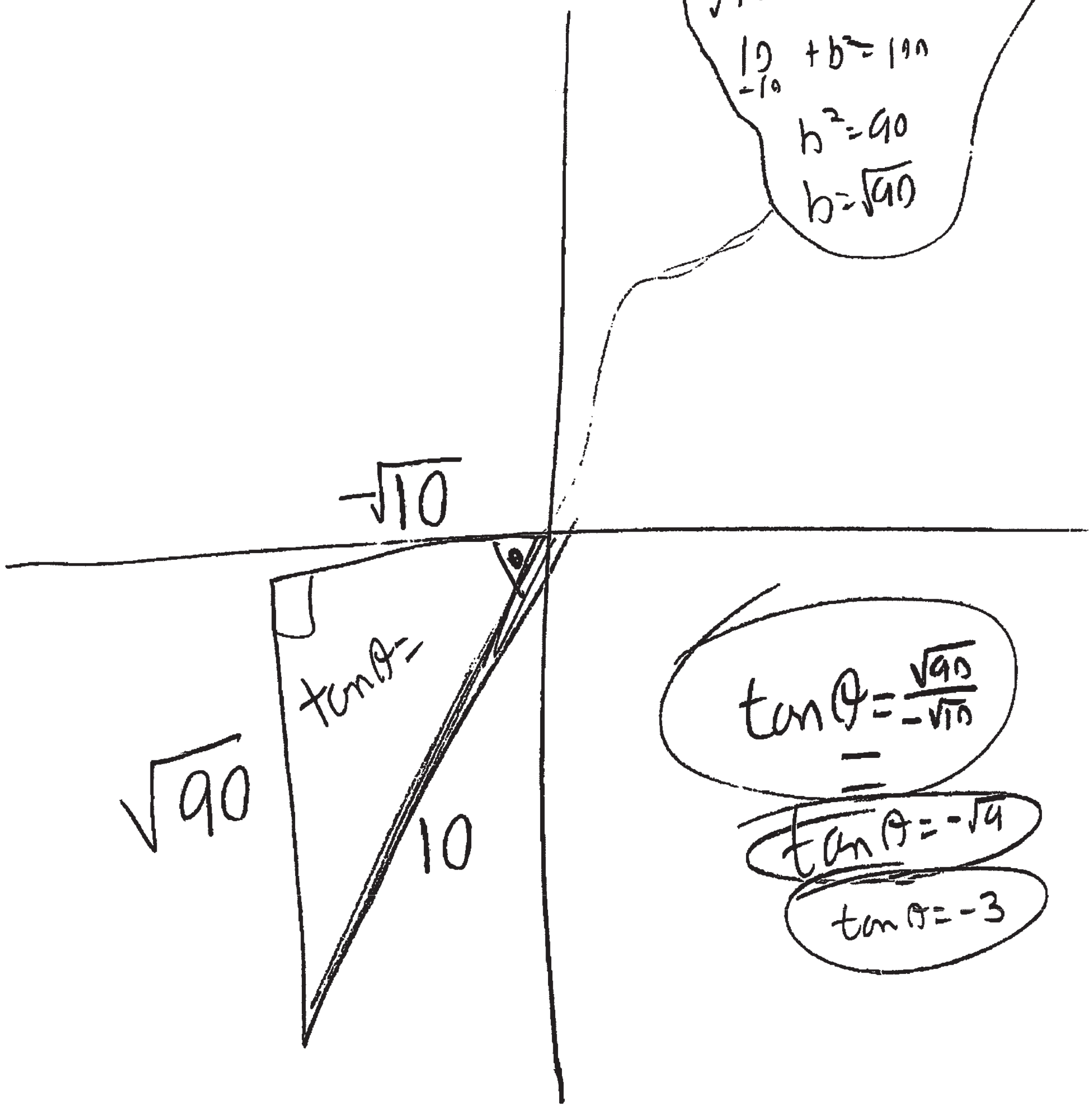
29 An angle, θ, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\dfrac{\sqrt{10}}{10}$, determine the value of $\tan\theta$.

$(-\sqrt{10})^2 + b^2 = 10^2$

$10 + b^2 = 100$
-10

$b^2 = 90$

$b = \sqrt{90}$



$\tan\theta = \dfrac{\sqrt{90}}{-\sqrt{10}}$

$\tan\theta = -\sqrt{4}$

$\tan\theta = -3$

Score 1: The student made a sign error.

Question 29

29 An angle, θ, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of $\tan\theta$.

$\sin\theta = \pm\sqrt{1-\cos^2\theta}$

$\sin\theta = \pm\sqrt{1-\left(\frac{-\sqrt{10}}{10}\right)^2}$

$\sin\theta = \pm\sqrt{1-\frac{10}{100}}$

$\sin\theta = \pm\sqrt{1-\frac{1}{10}}$

$\sin\theta = \pm\sqrt{\frac{9}{10}}$

$\sin\theta = \pm\frac{3\sqrt{10}}{10}$

find value of tan

$\tan = \frac{\sin\theta}{\cos\theta}$

$\tan\theta = \frac{\frac{\pm 3\sqrt{10}}{10}}{\frac{-\sqrt{10}}{10}}$

$\tan\theta = \pm\frac{3\sqrt{10}}{10}\cdot\frac{-10}{\sqrt{10}}$

$\tan\theta = \pm 3$

Score 1: The student did not determine the correct sign.

Question 29

29 An angle, θ, is drawn in standard position and terminates in Quadrant III. Given $\cos\theta = -\frac{\sqrt{10}}{10}$, determine the value of $\tan\theta$.

A

H

O

A

$$-\sqrt{10}^2 + B^2 = 10^2$$

$$-10 + B^2 = 100$$

$$B^2 = 110$$

$$\sqrt{110}$$

$$\frac{\sqrt{110}}{-\sqrt{10}} \quad \frac{-\sqrt{10}}{\cancel{-\sqrt{10}}} \quad \frac{-\sqrt{1100}}{10}$$

Score 0: The student made multiple errors.

Question 30

30 Solve algebraically for all values of x.

$$\sqrt{x+5} - x = 3$$

$\sqrt{x+5} - x = 3$

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

$\sqrt{1} - (-4) = 3$

$1 - (-4) = 3$

$5 = 3$ X

$\sqrt{x+5} - x = 3$

$\sqrt{(-1)+5} - (-1) = 3$

$\sqrt{4} - (-1) = 3$

$2 - (-1) = 3$

$3 = 3$ ✓

$+x \quad +x$

$(\sqrt{x+5})^2 = (x+3)^2$

$(x+3)(x+3)$

$x^2 + 3x + 3x + 9$

$x^2 + 6x + 9$

$x + 5 = x^2 + 6x + 9$

$-x - 5 \qquad -x - 5$

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

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

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

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

$x + 1 = 0 \qquad x + 4 = 0$

$-1 \quad -1 \qquad -4 \quad -4$

✓ $x = -1 \qquad x = -4$ X

$\boxed{x = -1}$

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

Question 30

30 Solve algebraically for all values of x.

$$\sqrt{x+5} - x = 3$$

Answer

$x = -1$

$\cancel{x = -4}$ → Does not work

$+x \quad +x$

$\sqrt{x+5}^2 = (x+3)^2$

$x + 5 = (x+3)(x+3)$

$x + 5 = x^2 + 3x + 3x + 9$

$x + 5 = x^2 + 6x + 9$

$-x \ -5 \qquad\qquad -x \ -5$

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

Then factor

$4 \cdot 1 = 4$

$4 + 1 = 5$

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

factors

Check = ↓

$x^2 + 4x + 1x + 4$

$x^2 + 5x + 4$

Re check

$\sqrt{-1+5} - -1 = 3$

$3 = 3$

$\sqrt{-4+5} - -4 = 3$

$= 5$

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

Question 30

30 Solve algebraically for all values of x.

$$\sqrt{x+5} - x = 3$$

$(x+3)(x+3)$
$x^2+3x+3x+9$

Check:
$\sqrt{x+5} - x = 3$
$\sqrt{-4+5} - 4 = 3$
$\sqrt{1} - 4 = 3$

$+x \quad +x$
$(\sqrt{x+5})^2 = (x+3)^2$
$x+5 = x^2+6x+9$
$-x-5 \qquad -x-5$
$0 = x^2+5x+4$

$0 = x^2+x+4x+4$
$0 = x(x+1)+4(x+1)$
$0 = (x+4)(x+1)$
$x+4=0 \quad x+1=0$
$-4 \; -4 \quad -1 \; -1$
$x = \cancel{-4} \quad \cancel{-1}$
Reject Reject

$\sqrt{x+5} - x = 3$
$\sqrt{-1+5} - 1 = 3$
$\sqrt{4} - 1 = 3$
$2 - 1 = 3$
$1 \neq 3$

There are no solutions for x

Score 1: The student made a repeated computational error in checking solutions.

Question 30

30 Solve algebraically for all values of x.

$$\sqrt{x+5} - x = 3$$

$+x \quad +x$

$(\sqrt{x+5})^2 = (3+x)^2 = $

$(3+x)(3+x)$

$9+3x+3x+x^2$

$x+5 = x^2+6x+9$

$-x-5 \qquad -x-5$

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

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

$x = \dfrac{-5 \pm \sqrt{5^2-4(1)(4)}}{2(1)}$

$\dfrac{-5 \pm \sqrt{25-16}}{2}$

$\dfrac{-5 \pm \sqrt{9}}{2}$

$\dfrac{-5 \pm 3}{2}$

$\dfrac{-5+3}{2} = \dfrac{-2}{2}$ $\dfrac{-5-3}{2}$

$\boxed{x=-1 \quad x=-4}$

check

$\sqrt{-1+5}+1=3$

$\sqrt{4}+1=3$

$2+1=3$

$3 \neq 3$ ✓

$\sqrt{-4+5}+4=3$

$\sqrt{1}+4=3$

$-1+4=3$ ✓

$1+4=5$ x

Score 1: The student did not correctly identify the extraneous solution.

Question 30

30 Solve algebraically for all values of x.

$$\sqrt{x+5} - x = 3$$

$$\sqrt{x+5} \quad -x = 3$$
$$+x \quad +x$$
$$(\sqrt{x+5})^2 = (3+x)^2$$

$$x+5 = (3+x)(3+x)$$
$$x+5 = 9+3x+3x+x^2$$
$$x+5 = 9+9x+x^2$$
$$-x \; -5 \quad -5 \; -x$$
$$0 = 4-8x+x^2$$
$$x^2+8x-4=0$$

a= 8

b=

$$\frac{-b \pm \sqrt{(b^2)-4(a)(c)}}{2(a)}$$

$$-\frac{(8) \pm \sqrt{(8)^2-4(1)(-4)}}{2(1)}$$

$$\frac{-8 \pm \sqrt{80}}{2}$$

$$\frac{-8 \pm \sqrt{16}\sqrt{5}}{2}$$

$$\frac{-8 \pm 4\sqrt{5}}{2}$$

FINAL ANSWER $\rightarrow$ $4 \pm 2\sqrt{5}$

Score 0: The student made multiple errors and did not reject extraneous solutions.

Question 30

30 Solve algebraically for all values of x.

$$\sqrt{x+5} - x = 3$$

$\sqrt{x+5} - x = 3$

$\sqrt{x+5}^2 = x+3^2$

$x+5 = (x+3)^2$

$x+5 = x^2+6x+9$

$x = x^2+6x+4$

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

$\cancel{(x^2-5x-1x+4=0}$

$\cancel{x(x^2-5)-1(x-4)=0}$

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

$x=1, x=4$

$(x+5)(x+3)$

Score 0: The student made a computational error and did not reject extraneous solutions.

Question 31

31 Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is \$42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

$$S_n = \frac{a_1 - a_1 r^n}{1 - r}$$

$$S_{30} = \frac{42{,}000 - 42{,}000(1.03)^{30}}{1 - 1.03}$$

\$1998167.46

$$\boxed{\$1998000}$$

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

Question 31

31 Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is $42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

$a_n = a_1(r^{n-1})$

$a_{30} = 42000(1.03^{29})$

$a_{30} = 99000$

Score 1: The student made one conceptual error.

Question 31

31 Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is \$42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

$$S_n = \frac{a_1 - a_1 r^n}{1-r}$$

$$S_{30} = \frac{42000 - 42000^{1.03}}{1 - 1.03}$$

$$S_{30} = \$526750.651$$

$$S_{30} = \$527000$$

$$\boxed{\$527,000}$$

Score 1: The student incorrectly substituted into the formula.

Question 31

31 Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is \$42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

$$S_n = \frac{a_1 - a_1 r^n}{1 - r}$$

$$S_n = \frac{42000 - 4200(1.03)^n}{1 - 1.03}$$

$42000(1.03)^{30} = \boxed{\$101945}$

Score 0: The student made multiple errors.

Question 31

31 Use the geometric series formula to determine the total 30-year earnings for an employee whose first-year salary is $42,000 and earns an annual raise of 3%, rounded to the *nearest thousand dollars*.

$a_1 = 42000$

$r = .03$

$n = 30$

$$S_n = \frac{42000 - 42000(.03)^{30}}{1 - .03}$$

$$S_n = 43299$$

Score 0: The student made multiple errors.

32 Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$$2x^2 = 2x - 1$$
$$-2x+1 \quad -2x+1$$

$$2x^2 - 2x + 1 = 0$$

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

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

$$x = \frac{2 \pm \sqrt{-4}}{4}$$

$$x = \frac{2}{4} \pm \frac{2i}{4}$$

$$x = \frac{1}{2} \pm \frac{1}{2}i$$

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

Question 32

32 Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$$2x^2 = 2x - 1$$

$$2x^2 - 2x = -1$$

$$x^2 - x = \frac{-1}{2}$$

$$x^2 - x + \frac{1}{4} = -\frac{1}{2} + \frac{1}{4}$$

$$\left(x - \frac{1}{2}\right)\left(x - \frac{1}{2}\right) = -\frac{1}{4}$$

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

$$x - \frac{1}{2} = i\left(\frac{\pm 1}{2}\right)$$

$$x = \frac{1}{2} \pm \frac{1}{2}i$$

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

Question 32

32 Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$2x^2 = 2x - 1$

$-2x+1 \quad -2x+1$

$2x^2 - 2x + 1 = 0$

$a = 2, b = -2, c = 1$

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

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

$x = \frac{2 \pm \sqrt{-4}}{4}$

$\sqrt{-4}$

$\sqrt{-1} \quad \sqrt{4}$

$i \quad 2$

$2i$

$x = \frac{2 \pm 2i}{4}$

$\boxed{x = \frac{1 \pm i}{2}}$

Score 1: The student did not express the answer in $a + bi$ form.

Question 32

32 Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

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

$$2x^2 = 2x - 1$$
$$-2x + 1 \quad -2x + 1$$

$$2x^2 - 2x + 1 = 0$$

$$\frac{-(-2) \pm \sqrt{(-2)^2 - 4(2)(1)}}{2(2)}$$

$$\frac{+2 \pm \sqrt{-4}}{4}$$

$$\frac{2 + \sqrt{-4}}{4} \text{ or } \frac{2 - \sqrt{-4}}{4}$$

$$\frac{2 + 2i}{4} \text{ or } \frac{2 - 2i}{4}$$

$$\boxed{\frac{1}{2} + i \text{ or } \frac{1}{2} - i}$$

Score 1: The student did not correctly simplify the solution.

Question 32

32 Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$$0 = -2x^2 + 2x - 1$$

$$\frac{-2 \pm \sqrt{4+8}}{-4}$$

$$\frac{-2 \pm \sqrt{12}}{-4}$$

$$\sqrt{12} \quad \sqrt{4} \quad \sqrt{3} \quad \frac{2\sqrt{3}}{-4}$$

$$\boxed{\frac{1}{2} \pm \frac{2\sqrt{3}}{-4} i}$$

Score 0: The student made multiple errors.

Question 32

32 Algebraically determine the solution(s) to the equation $2x^2 = 2x - 1$, in simplest $a + bi$ form.

$$2x^2 = 2x - 1$$
$$-2x+1 \quad -2x+1$$

$$2x^2 - 2x + 1 = 0 \qquad a=2 \quad b=-2 \quad c=1$$

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

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

$$= \sqrt{-2^2-8}$$
$$= \sqrt{-4-8}$$
$$= \sqrt{-12}$$
$$4 \quad 3$$

$$2i\sqrt{3}$$

Score 0: The student made multiple errors.

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

$y = a(b)^x$ $\quad$ $y = 9290.57(1.02)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$$\frac{15{,}000}{9290.57} = \frac{9290.57(1.02)^x}{9290.57}$$

$$\frac{15{,}000}{9290.57} = (1.02)^x$$

$$\log_{1.02}\frac{15{,}000}{9290.57} = \cancel{\log_{1.02} 1.02}^x$$

$x = 24.2$ years

$$\log_{1.02}\frac{15{,}000}{9290.57} = x$$

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

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

$$y = 9290.57 \cdot 1.02^x$$

(b) Use the rounded equation from part a to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$$\frac{15000}{9290.57} = \frac{9290.57}{9290.57} \cdot 1.02^x$$

$$\frac{\log 1.61454}{\log 1.02} = \frac{x \log 1.02}{\log 1.02}$$

$$24.19124 = x$$

$$\boxed{x = 24.2} \text{ years}$$

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

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

$$y = 9290.564(1.021)^x$$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was $15,000.

$$\frac{15000}{9290.564} = \frac{9290.564(1.021)^x}{9290.564}$$

$$1.615 = 1.021^x$$

$$\frac{\log 1.615}{\log 1.021} = \frac{\log 1.021}{\log 1.021}$$

$x = 23.1$ years

Score 3: The student incorrectly rounded the coefficients.

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

$$y = 9290.57(1.02)^x$$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$$\frac{15{,}000}{9290.57} = \frac{9290.57(1.02)^x}{9290.57}$$

$$1.61 = 1.02^x$$

$$\log 1.61 = x \log(1.02)$$

24.19 years

Score 3: The student made one rounding error.

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

$$9290.57(1.02)^x$$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was $15,000.

$$9290.57(1.02)^{24.2} = 15000$$

Score 2: The student wrote an expression and used a method other than algebraic.

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

$$y = 9290.57 \times 1.02^{x}$$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$$y = 9290.57 \times 1.02^{25}$$

Score 2: The student wrote a correct regression equation.

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

$9290.57(1.02)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

~~log~~ $9290.57(1.02)^x = 150$

$\log_{9476} 1500 = x$ ~~$\log_{1.02} 1500$~~

$x = 23$

Score 1: The student wrote a correct expression.

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

In calc

Stat Edit

(insert list from table)

Stat calc

0: ExpReg

Enter

$9290.57(1.02)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was $15,000.

$15000 = 9290.57(1.02)^x$

$1.6145 = (1.02)^x$

1.6 years

Score 1: The student wrote a correct expression.

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

$y = (a)(b^x)$

$y = (9292.9)(1.0)^x$

(b) Use the rounded equation from part a to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was \$15,000.

$15{,}000 = (9292.9)(1.0)^x$

$-9292.9 \quad -9292.9$

$5707.1 = 1.0^x$

18

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

Question 33

33 The gross domestic product (GDP) per capita measures worldwide economic output per person. The GDP per capita, y, in dollars, x years after 1990 is listed in the table below.

x	y
1	9680
6	10,201
18	13,713
25	15,552
29	16,976

$\frac{10,201}{9680} = 1.05$

(a) Based on these data, write an exponential regression equation to model the GDP per capita, in dollars, x years after 1990. Round all coefficients to the *nearest hundredth*.

$f(x) = 9680(1.05)^x$

(b) Use the rounded equation from part *a* to algebraically determine, to the *nearest tenth of a year*, the number of years after 1990 when GDP per capita was $15,000.

$15000 = 9680(1.05)^x$

$\log_{(1.05)} 15{,}000 = x$

$x = 9.0$ year

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

Question 34

34 Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

$$f(x) = x^3 + 3x^2 - 2x - 6$$

$$\begin{array}{r} x^2 - 2 \\ (x+3)\overline{\big)\,x^3 + 3x^2 - 2x - 6} \\ -(x^3 + 3x^2) \\ \hline 0 - 2x - 6 \\ -(-2x - 6) \\ \hline 0 \end{array}$$

Yes, $(x+3)$ is a factor because it has a remainder of 0

Determine all zeros of $f(x)$.

$0 = x^3 + 3x^2 - 2x - 6$

$0 = x^2(x+3) - 2(x+3)$

$0 = (x+3)(x^2 - 2)$

$x + 3 = 0$
$-3 \quad -3$
$x = -3$

$0 = x^2 - 2$
$+2 \quad +2$
$\sqrt{2} = \sqrt{x^2}$
$\pm\sqrt{2} = x$

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

Question 34

34 Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

$$f(x) = (x^3 + 3x^2) - (2x - 6)$$

$x^2(x+3) - 2(x+3)$

$(x^2-2)(x+3)$

Yes, $(x+3)$ is a factor of $f(x)$.

Determine all zeros of $f(x)$.

$(x^2-2)(x+3)=0$

$x^2-2=0$

$+2 \quad +2$

$\sqrt{x^2} = \pm\sqrt{2}$

$x = \pm\sqrt{2}$ ✓

$x=-3$ ✓

$\boxed{x = \{-3, \pm\sqrt{2}\}}$

check:

$(\sqrt{2})^3 + 3(\sqrt{2})^2 - 2(\sqrt{2}) - 6 = \cancel{0}$

$(-\sqrt{2})^3 + 3(-\sqrt{2})^2 - 2(-\sqrt{2}) - 6 = \cancel{0}$

$(-3)^3 + 3(-3)^2 - 2(-3) - 6 = 0$

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

Question 34

34 Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

$$f(x) = x^3 + 3x^2 - 2x - 6$$

$3 - 1 = 2$

(x+3) is a factor. there is no remainder.

x^3

	x^2	$+0x$	-2
x	x^3	$0x^2$	$-2x$
$+3$	$3x^2$	$0x$	-6

$3x^2$ $\quad -2x \quad -6$

$\underline{x^2 - 2}$

Determine all zeros of $f(x)$.

$x^3 + 3x^2 - 2x - 6 = 0$

$x^2(x+3) - 2(x+3) = 0$

$(x+3)(x^2 - 2) = 0$

$x = -3 \quad | \quad x^2 - 2 = 0$

$+2 \quad +2$

$\sqrt{x^2} = \sqrt{2}$

$x = \pm i\sqrt{2}$

$\boxed{-3, -i\sqrt{2}, i\sqrt{2}}$

Score 3: The student did not correctly find the zeros.

Question 34

34 Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

$$f(x) = x^3 + 3x^2 - 2x - 6$$

$x + 3 = 0$
$x = -3$

$-3 \to x$

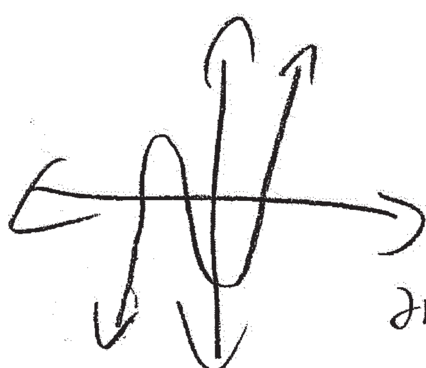
$x^3 + 3x^2 - 2x - 6 = 0$

$0 = 0$ ✓

$x + 3$ is a factor of $f(x)$ because it equals a zero

Determine all zeros of $f(x)$.

window
xmin = -10
xmax = 10
ymin = -10
ymax = 10



2nd → calc → zero

$x = 1.414214136$

$x = -1.414214$

Score 3: The student did not determine all zeros.

Question 34

34 Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

$$f(x) = x^3 + 3x^2 - 2x - 6$$

$$-3^3 + 3(3)^2 - 2(-3) - 6$$

$$-27 + 81 + 6 - 6$$

$$54 \neq 0 \quad \text{It is not a factor}$$

Determine all zeros of $f(x)$.

$$x^3 + 3x^2 - 2x - 6 = 0$$

$$x^2(x+3) - 2(x+3)$$

$$(x^2-2)(x+3)$$

$$x^2 - 2 = 0 \qquad x = -3$$

$$\sqrt{x^2} \; \pm\sqrt{2}$$

$$x = \sqrt{2}, -3$$

Score 2: The student made two errors.

Question 34

34 Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

$$f(x) = x^3 + 3x^2 - 2x - 6$$

$$\begin{array}{l} x+3=0 \\ \underline{\;\;-3\;\;-3} \\ x=-3 \end{array} \quad f(x)(-3)^3+3(-3)^2-2(-3)-6$$

$$=0$$

Yes, it is a factor due to no remainders.

Determine all zeros of $f(x)$.

No zeros due to there being no remainders.

Score 2: The student did not determine the zeros.

Question 34

34 Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

$$f(x) = x^3 + 3x^2 - 2x - 6$$

Long division,
if there is remainder,
its not

$$
\begin{array}{r l}
 & x^2 - 2 - 6 \\
x+3 \,\big) & x^3 + 3x^2 - 2x - 6 \\
 & -(x^3 + 3x^2) \\
 & + \cancel{-x^3} \cancel{-3x^2} \\
 & -2x - 6 \\
 & -(-2x - 6) \\
 & +2x + 6 \\
\hline
 & 0
\end{array}
$$

no remainder

~~$x \cdot 3x = 3x^2$~~

$x \cdot \underline{x^2} = x^3$

$x \cdot \underline{-2} = -2x$

Yes, $(x+3)$ is a factor b/c remainder is 0

Determine all zeros of $f(x)$.

where $x = 0$

$$\frac{x^3}{x^2} + \frac{3x^2}{x^2} \frac{-2x}{-2} \frac{-6}{-2}$$

$x = 3$

$$x^2(x + 3) - 2(x + 3)$$

$$(x^2 - 2)(x + 3)$$

$$(x + 2)(x - 2)(x + 3)$$

$x = -3$

Score 1: The student correctly interpreted the remainder.

Question 34

34 Consider the function $f(x)$ below. Is $(x + 3)$ a factor of $f(x)$? Justify your answer.

$$f(x) = x^3 + 3x^2 - 2x - 6$$

~~it is not a factor as it leaves a remainder~~

$$\cancel{\begin{array}{r|rrrr} -3 & 1 & 3 & -2 & -3 \\ & & -3 & 0 & 6 \\ \hline & 1 & 0 & -2 & \boxed{3} \end{array}}$$

~~$x + 3 \overline{) x^3 + 3x^2 - 2x - 6}$ x^2~~

it is a factor

Determine all zeros of $f(x)$.

$\{-3, ?, ?\}$

$$\begin{array}{r|rrrr} -6 & 1 & 3 & -2 & -3 \\ & & -6 & -4 & 2 \\ \hline & 6\ -3 & & - & 5 \end{array}$$

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

Question 34

34 Consider the function $f(x)$ below. Is $(x+3)$ a factor of $f(x)$? Justify your answer.

$$f(x) = x^3 + 3x^2 - 2x - 6$$

	x	$+3$
x	x^2	$3x$
$+3$	$3x$	9

$f(x+3) = (x+3)^3 + 3(x+3)^2 - 2(x+3) - 6$

$= 2x^2 + 12x + 18 \quad + 3(x^2 + 6x + 9) - 2x - 6 - 6$

$= 2x^2 + 12x + 18 + 3x^2 + 18x + 27 - 2x - 12$

$= 5x^2 + 28x + 33$

+3) is not factor of f(x)

$x2 + 3x + x^2 + 3x + 3x + 9 + 3x + 9$

$2x^2 + 12x + 18$

$(x+3)(x+3)(x+3)$

Determine all zeros of $f(x)$.

$(x+3)$

$x_1 = -x$

$x_2 = -3$

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

Question 35

35 Solve the system algebraically:

$$
\begin{aligned}
① \quad 2a + b - c &= -4 \\
② \quad 4a + b + c &= 3 \\
③ \quad -2a - 3b + 2c &= 11
\end{aligned}
$$

③ $-2a - 3b + 2\cancel{c} = 11$
(-2) ② $-8a - 2b - 2c = -6$
ⓐ $-10a - 5b = 5$

③ $-2a - 3b + 2\cancel{c} = 11$
(2) ① $4a + 2b - 2c = -8$
ⓑ $2a - b = 3$

ⓐ $-10a - 5\cancel{b} = 5$
(-5) ⓑ $-10a + 5b = -15$
$\frac{-20a}{-20} = \frac{-10}{-20}$
$a = \frac{1}{2}$

ⓑ $2(\frac{1}{2}) - b = 3$
$1 - b = 3$
$-1 \qquad -1$
$\frac{-b}{-1} = \frac{2}{-1}$
$b = -2$

① $2(\frac{1}{2}) - 2 - c = -4$
$1 - 2 - c = -4$
$-1 - c = -4$
$+1 \qquad +1$
$\frac{-c}{-1} = \frac{-3}{-1}$
$c = 3$

$$\boxed{\begin{aligned} a &= \tfrac{1}{2} \\ b &= -2 \\ c &= 3 \end{aligned}}$$

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

Question 35

35 Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$

$\cancel{2a} + b - C = -4$
$-\cancel{2a} - 3b + 2c = 11$

$-2b + C = 7$
$+2b \qquad +2b$

$\boxed{C = 7 + 2b}$

$(2) -2a - 3b + 2c = 11$

$-\cancel{4a} - 6b + 4c = 22$
$\cancel{4a} + b + C = 3$

$-5b + 5c = 25$
$+5b \qquad +5b$

$\frac{5c}{5} = \frac{25}{5} + \frac{5b}{5}$

$C = 5 + b$

$7 + 2b = 5 + b$
$-5 \qquad -5$

$2 + 2b = b$
$-2b \quad -2b$

$\frac{2}{-1} = \frac{-b}{-1}$

$\boxed{-2 = b}$

$C = 7 + 2(-2)$

$C = 7 - 4$

$\boxed{C = 3}$

$-2a - 3(-2) + 2(3) = 11$

$-2a + 6 + 6 = 11$

$-2a + 12 = 11$
$-12 \quad -12$

$\frac{-2a}{-2} = \frac{-1}{-2}$

$\boxed{a = .5}$

$\boxed{(a, b, c) \rightarrow (.5, -2, 3)}$

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

Question 35

35 Solve the system algebraically:

$$\begin{aligned} A \quad -2(2a + b - c &= -4 \\ B \quad 4a + b + c &= 3 \\ C \quad -2a - 3b + 2c &= 11 \end{aligned}$$

$-4a - 2b + 2c = 8$
$+\ 4a + b + c = 3$
$-b + 3c = 11$

$4a + b + c = 3$
$+\ -4a - 3b + 4c = 22$
$-2b + 5c = 25$

$-2b + 5c = 25$
$+\ 2b - 6c = -22$
$-c = 3$

$c = -3$

$-b + 3(-3) = 11$

$-b - 9 = 11$
$+9 \quad +9$

$\frac{-b}{-1} = \frac{20}{-1}$

$b = -20$

$4a - 23 = 3$
$+23$

$4a = 26$

$a = 6.5$

Score 3: The student made one computational error distributing 2 in the second elimination.

Question 35

35 Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$

$2a + b - \cancel{c} = -4$
$+\ 4a + b + \cancel{c} = 3$
$6a + 2b = -1$

$-2a - 3b + 2c = 11$
$-2(4a + b + c = 3)$

$-2a - 3b + 2\cancel{c} = 11$
$+\ -8a - 2b - 2\cancel{c} = -6$
$-10a - 5b = 5$

$5(6a + 2b = -1)$
$2(-10a - 5b = 5)$

$30a + 10\cancel{b} = -5$
$-20a - 10b = 10$
$\frac{10a}{10} = \frac{-50}{10}$
$\boxed{a = -5}$

$-10a - 5b = 5$
$-10(-5) - 5b = 5$
$50 - 5b = 5$
$\frac{-5b}{-5} = \frac{-45}{-5}$
$\boxed{b = 9}$

$4(-5) + 9 + c = 3$
$-20 + 9 + c = 3$
$\boxed{c = -8}$

Score 2: The student made two computational errors.

Question 35

35 Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$

Equations 1 & 3.

$\cancel{2a} + b - c = -4$

$-\cancel{2a} - 3b + 2c = 11$

$-2b + c = 7$

Equations 2 & 3

$4a + b + c = 3$

$(-2a - 3b + 2c = 11)$

$\cancel{4a} + b + c = 3$

$-\cancel{4a} - 6b + 4c = 22$

$-5b + 5c = 25$

$\cancel{4a} + b + c = 3$

$-\cancel{4a} - 12b + 8c = 44$

$-11b + 9c = 47$

Solve 1 and 2

$-9(-2b + c = 7)$

$-11b + 9c = 47$

$18b - \cancel{9c} = -63$

$-11b + \cancel{9c} = 47$

$7b = -16$

$b = -\frac{16}{7}$

Score 1: The student created a correct system of two equations with the same two variables.

Question 35

35 Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$

1

Matrix

$a = .5$
$b = -2$
$c = 3$

Score 1: The student stated the solution, but no work was shown.

Question 35

35 Solve the system algebraically:

$$2a + b - c = -4$$
$$4a + b + c = 3$$
$$-2a - 3b + 2c = 11$$

Step 1:

① + ②

$2a + b - \cancel{c} = -4$

$+ \quad 4a + b + \cancel{c} = 3$

$6a + 2b = -1$

Step 2:

① + ③ $-2(2a + b + c = 4)$

$-4a - 2b - \cancel{2c} = -8$

$+ \quad -2a - 3b + \cancel{2c} = 11$

$-6a - 5b$

$2a + b - c = -4$

$+ \quad -2a - 3b + 2c = 11$

$-2b + c = 7$

$-4a - 2b + 2c = 8$

$+ \quad 4a + b + c = 3$

$-b + 3c \quad 5$

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

Question 36

36 Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

$4(2x-1) - [5(x+1)^2 + 3(x+1) - 12]$

$= 4(2x-1) - 5(x+1)^2 - 3(x+1) + 12$

$= 8x - 4 - 5(x^2+2x+1) - 3x - 3 + 12$

$= 8x - 4 - 5x^2 - 10x - 5 - 3x - 3 + 12$

$= -5x^2 - 10x + 8x - 3x - 4 - 5 - 3 + 12$

$= -5x^2 - 5x - 12 + 12$

$= -5x^2 - 5x$

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

Question 36

36 Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [\,f(x + 1)]$ as a polynomial in standard form.

$$= 4(2x-1) - (5(x+1)^2 + 3(x+1) - 12)$$

$$= 8x - 4 - (5x^2 + 10x + 5 + 3x + 3 - 12)$$

$$= 8x - 4 - (5x^2 + 13x - 4)$$

$$= 8x - 4 - 5x^2 - 13x + 4$$

$$= \boxed{-5x^2 - 5}$$

Score 3: The student made one computational error.

Question 36

36 Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

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

$x^2+x+x+1$

$4(2x-1) - [5(x+1)^2 + 3(x+1) - 12]$

$8x - 4 - x^2 - x - x - 1 - 3x - 3 + 12$

$-x^2 - 3x + 4$

Score 2: The student made two computational errors.

Question 36

36 Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [\,f(x + 1)]$ as a polynomial in standard form.

$4(2x-1) - 5(x+1)^2 + 3(x+1) - 12$

$8x - 4 - 5(x^2 + 2x + 1) + 3x + 3 - 12$

$\cancel{8x} - 4 - \cancel{5x^2} - \cancel{10x} - 5 + \cancel{7x} + 3 - 12$

$-5x^2 - x - 18$

Score 2: The student partially distributed the negative and made a computational error.

Question 36

36 Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [\,f(x + 1)]$ as a polynomial in standard form.

$4(2x-1) - [(5x^2+3x-12)(x+1)]$

$(8x-4) - [5x^3 + 3x^2 - 12x + 5x^2 + 3x - 12]$

$-[5x^3 + 8x^2 - 9x - 12]$

$(8x-4) + (-5x^3 - 8x^2 + 9x + 12)$

$\boxed{-5x^3 - 8x^2 + 17x + 9}$

Score 1: The student did not evaluate $f(x+1)$ and made a computational error.

Question 36

36 Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [\,f(x + 1)]$ as a polynomial in standard form.

$4g(x) - [f(x+1)]$

$4(2x-1) - [5(x+1)^2 + 3(x+1) - 12]$

$(8x-4) - [25x^2 + 1 + 3x + 1 - 12]$

$(8x-4) - [258x^2 + 10]$

Score 1: The student substituted correctly.

Question 36

36 Given: $f(x) = 5x^2 + 3x - 12$ and $g(x) = 2x - 1$.

Express $4g(x) - [f(x + 1)]$ as a polynomial in standard form.

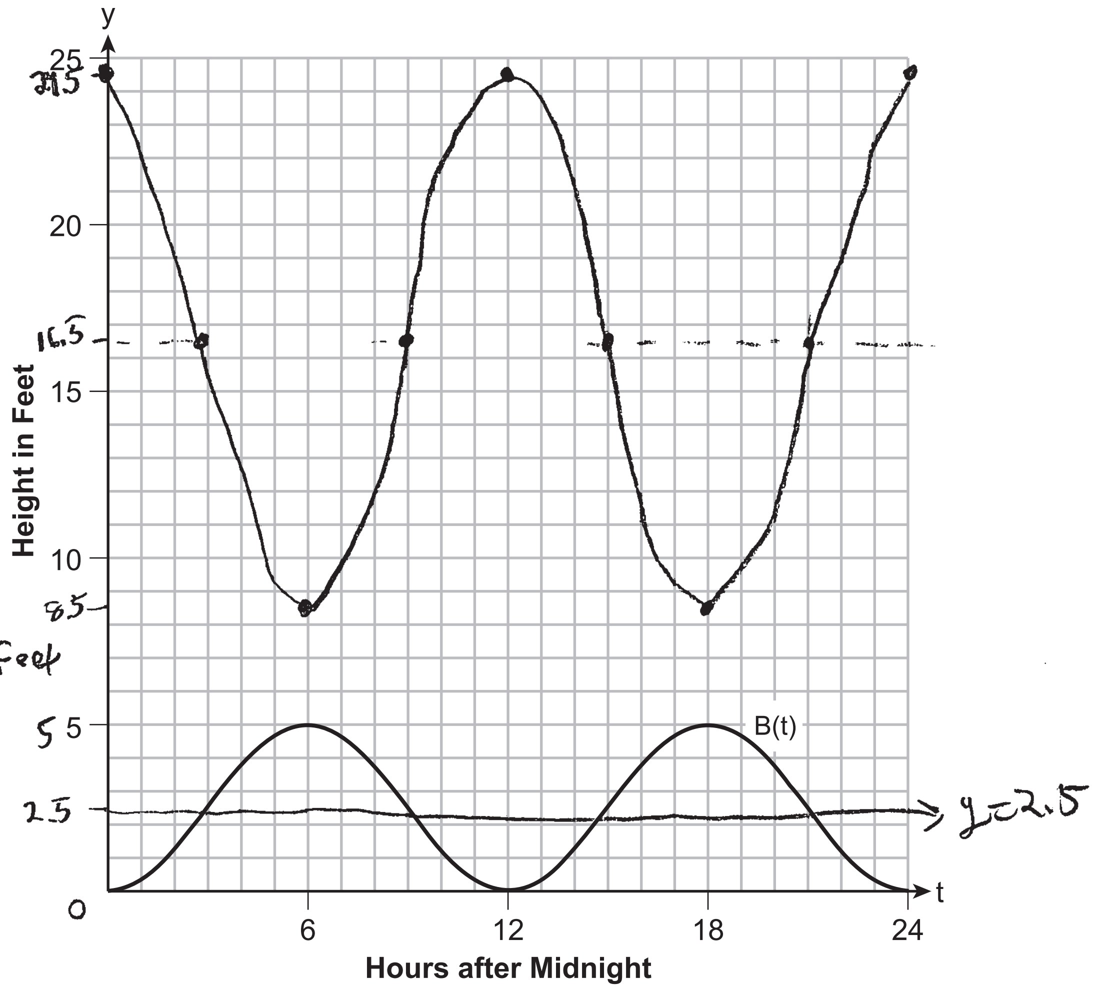
$$4(2x-1) - 5x^2 + 3x - 12$$

$$8x - 4 - 5x^2 + 3x - 12$$

$$-5x^2 + 11x - 16$$

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

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.



$a = 2.5$ feet

$b =$

$12 = \frac{2\pi}{b}$

$12b = 2\pi$

$b = \frac{\pi}{6}$

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

Question 37

Question 37 continued

State the period of $B(t)$, in hours.

$\boxed{P = 12 \text{ hours}}$

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$\boxed{B(t) = -2.5\cos\left(\frac{\pi}{6}t\right) + 2.5}$

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \le t \le 24$.

$a = 8$ ft

midline $= 16.5$

$b = \frac{\pi}{6}$

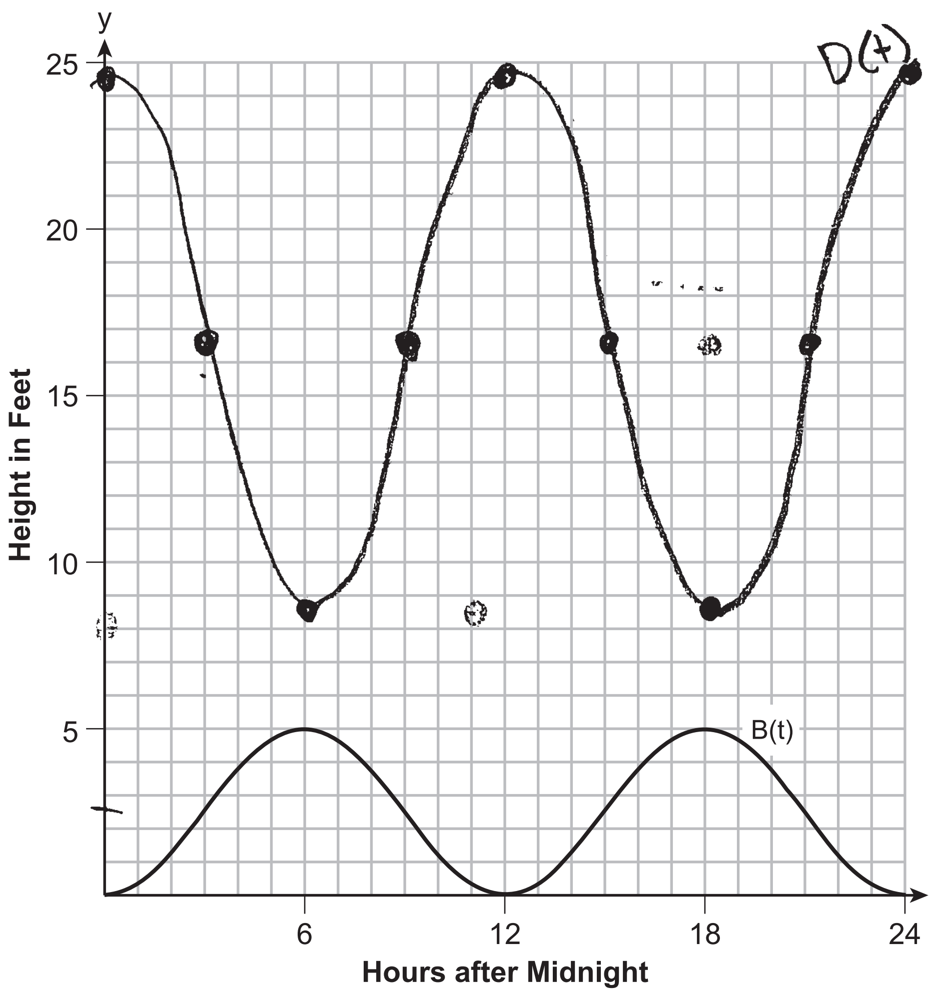
$P = \frac{2\cancel{\pi}(6)}{\cancel{\frac{\pi}{6}}(6)} = 12$

State the height, in feet, of the low tide in Derby.

$\boxed{8.5 \text{ ft}}$

Question 37

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.



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

Question 37

Question 37 continued

State the period of $B(t)$, in hours.

$p = 12$

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$B(t) = -2.5\cos\left(\frac{\pi}{6}t\right) + 2.5$

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \le t \le 24$.

✓

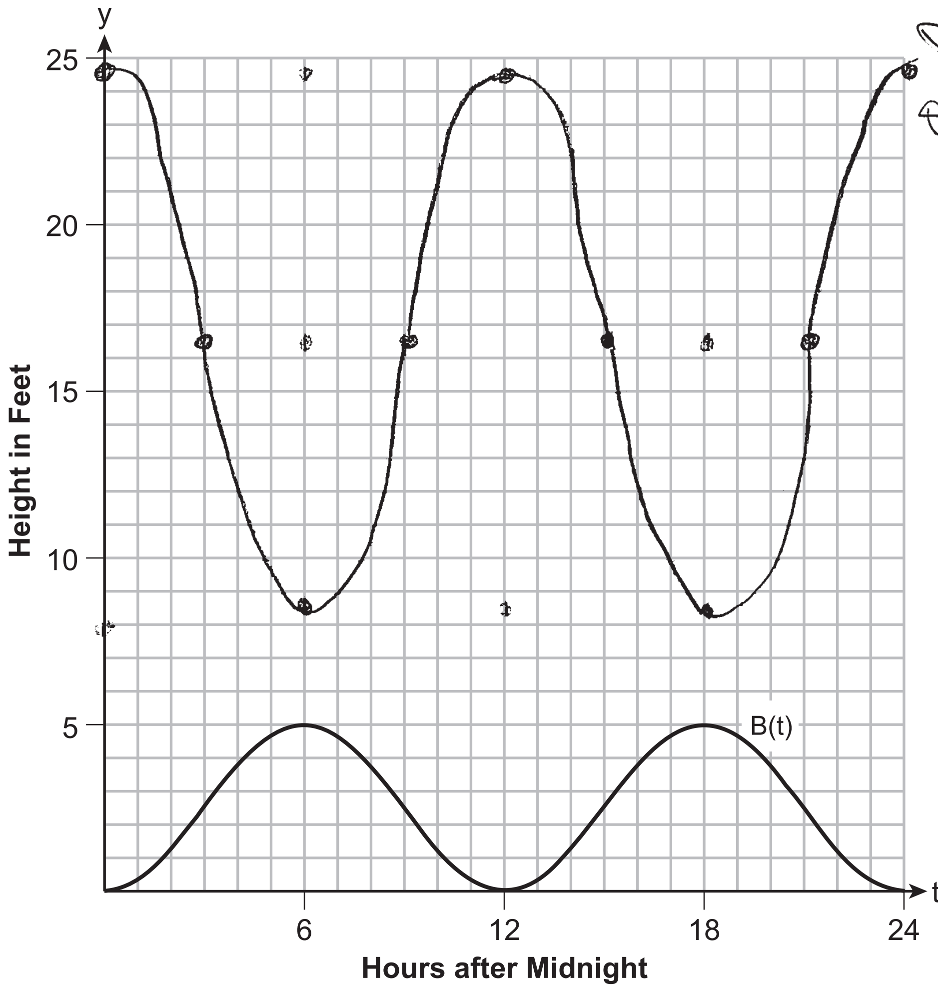
State the height, in feet, of the low tide in Derby.

8.5

Question 37

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.

$D(t) = 8\cos(\frac{\pi}{6}t) + 16$



Score 5: The student did not write a negative cosine equation.

Question 37 continued

State the period of $B(t)$, in hours.

12 hours

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$B(t) = 2.5(\cos(\frac{\pi}{6}t)) + 2.5$

$12 = \frac{2\pi}{B}$

$12B = 2\pi$

$B = \pi/6$

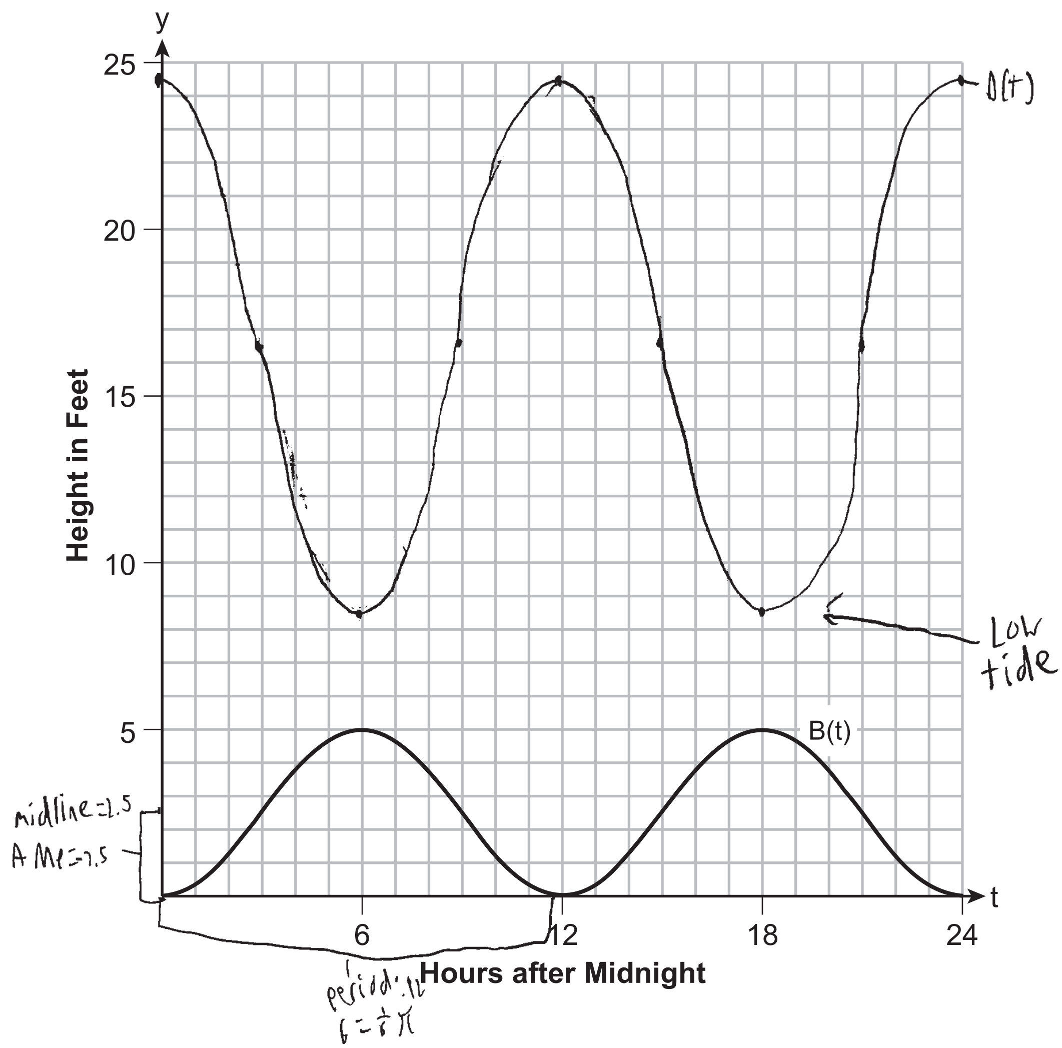
In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \le t \le 24$.

State the height, in feet, of the low tide in Derby.

8.5 ft

Question 37

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.



Score 5: The student did not include the variable in the cosine equation.

Question 37 continued

State the period of $B(t)$, in hours.

12 hours

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$a = -2.5$
$b = \frac{\pi}{6}$
$c = 2.5$

$B(t) = -2.5\cos\left(\frac{\pi}{6}\right) + 2.5$

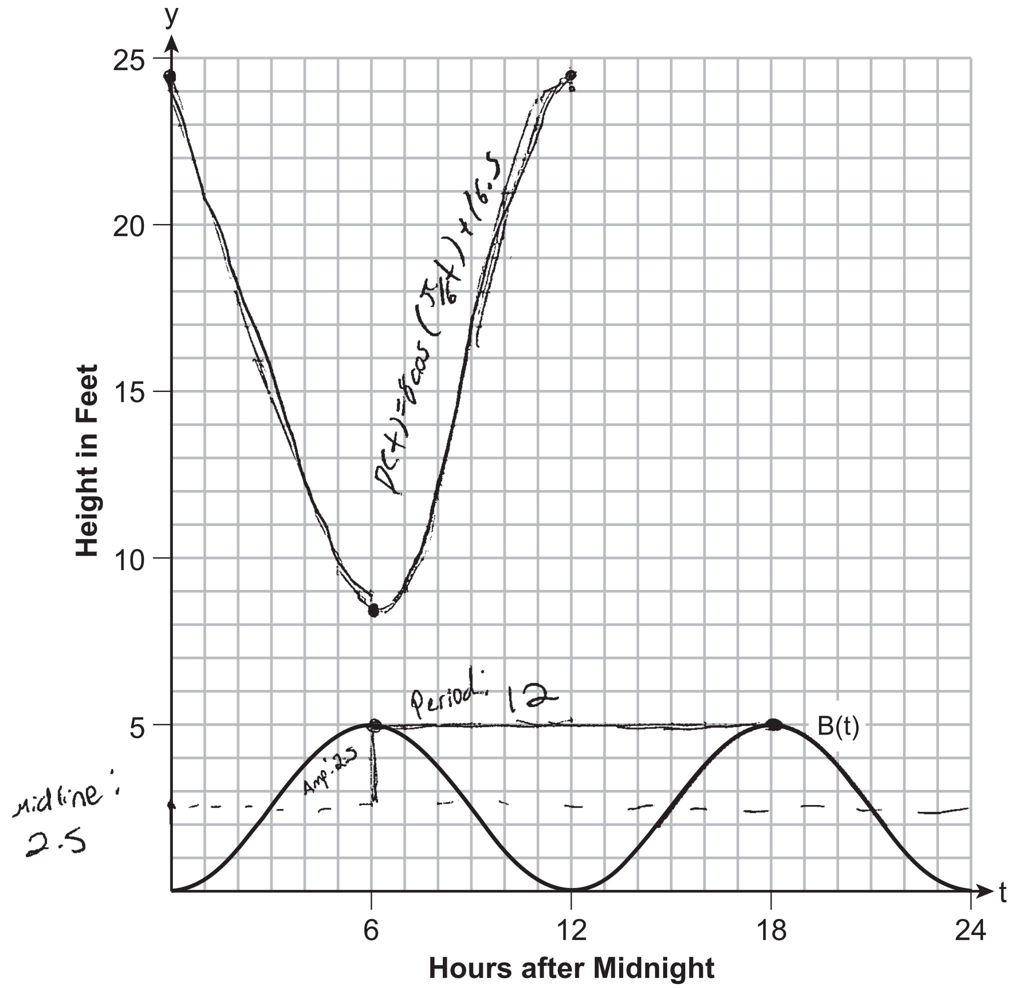
In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

State the height, in feet, of the low tide in Derby.

8.5 feet

Question 37

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.



Score 4: The student made a graphing error and did not write a negative cosine equation.

Question 37 continued

State the period of $B(t)$, in hours.

12

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$\frac{2\pi}{12} = \frac{\pi}{6}$

$B(t) = 2.5\cos(\frac{\pi}{6}t) + 2.5$

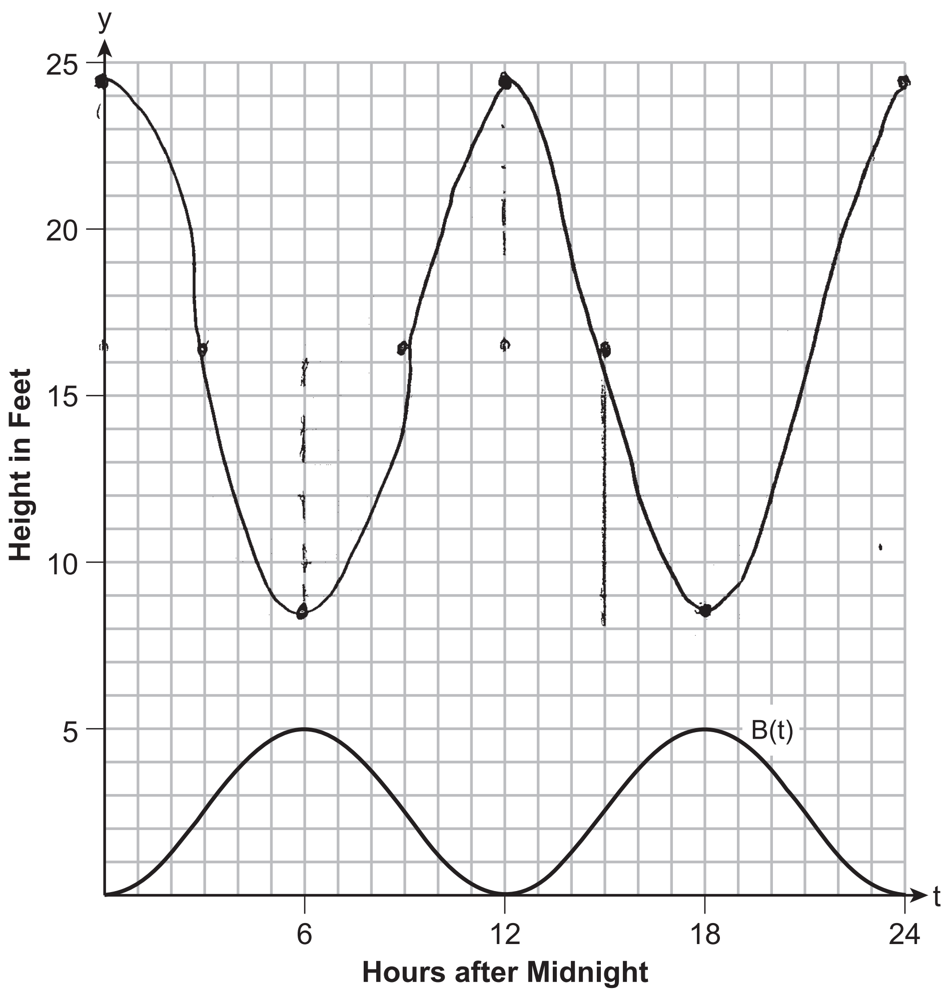
In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \le t \le 24$.

State the height, in feet, of the low tide in Derby.

The low tide / the minimum of the graph is 8.5 ft

Question 37

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.



Score 3: The student did not state the correct period and did not write a correct equation.

Question 37

Question 37 continued

State the period of $B(t)$, in hours.

18 hours

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$B(t) = 5\cos\left(\frac{\pi}{9}x\right)$

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \leq t \leq 24$.

$\frac{2\pi}{x} = \frac{\pi}{6}$

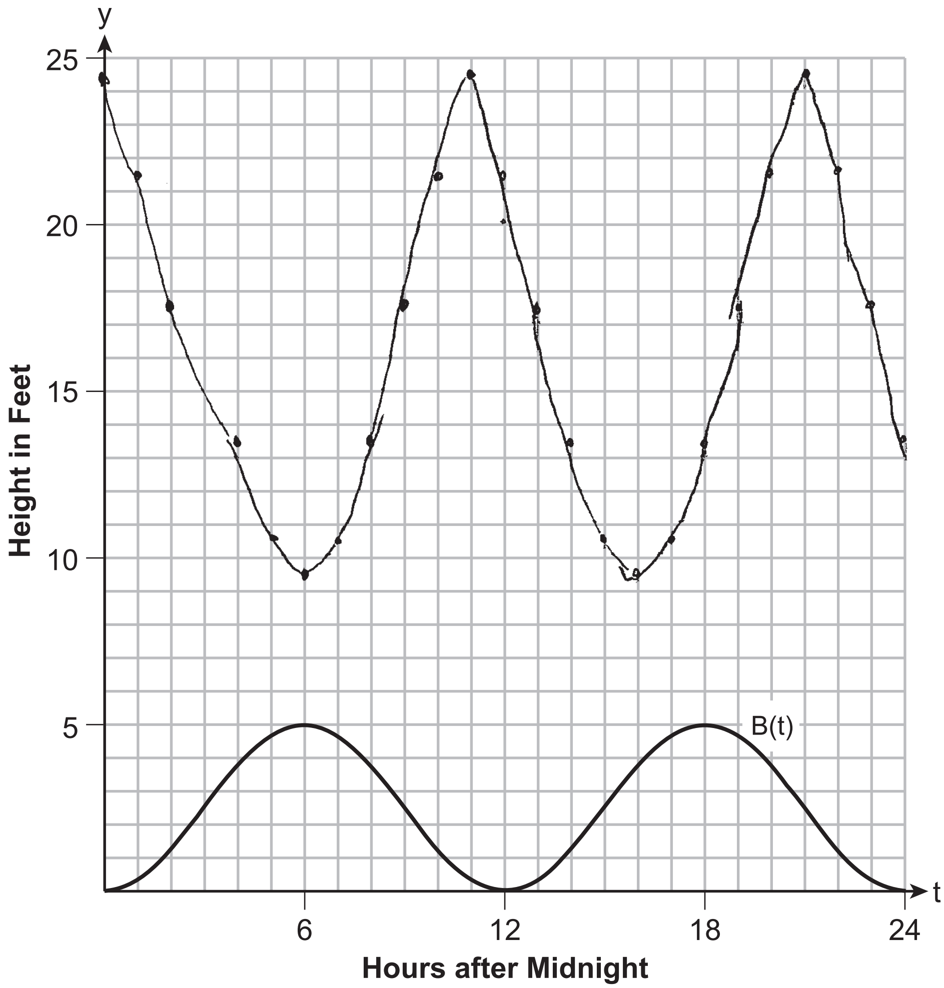
$\frac{\pi x}{\pi} = \frac{12\pi}{\pi}$ $x = 12$

State the height, in feet, of the low tide in Derby.

the height is 8.5 as low tide in Derby

Question 37

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.



Score 2: The student stated the period and minimum correctly.

Question 37

Question 37 continued

State the period of $B(t)$, in hours.

12

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$B(t) = 2\cos(6t) + 2.5$

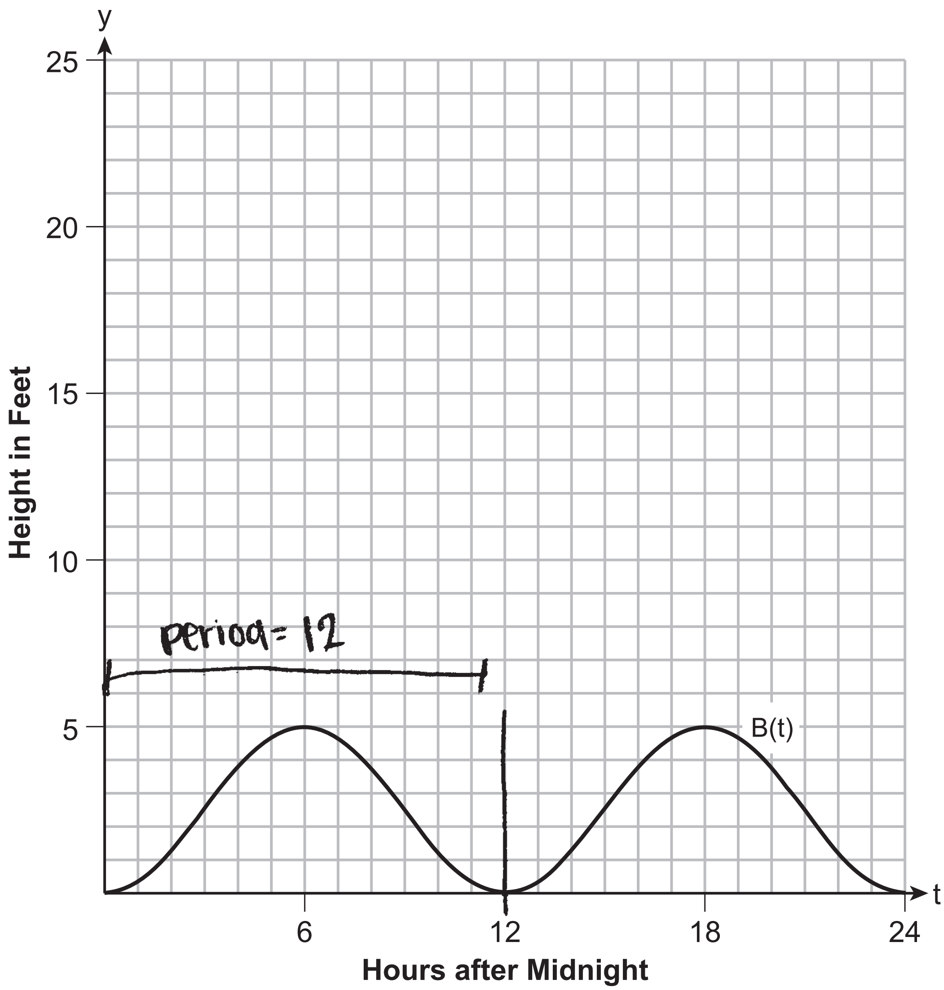
In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \le t \le 24$.

State the height, in feet, of the low tide in Derby.

8.5 ft

Question 37

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.



Score 1: The student stated the period correctly.

Question 37 continued

State the period of $B(t)$, in hours.

period = 12

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) \pm c$.

$\frac{2\pi}{b} = \frac{12}{1}$

$2\pi = 12b$

$b = \frac{2\pi}{12} = \frac{\pi}{6}$

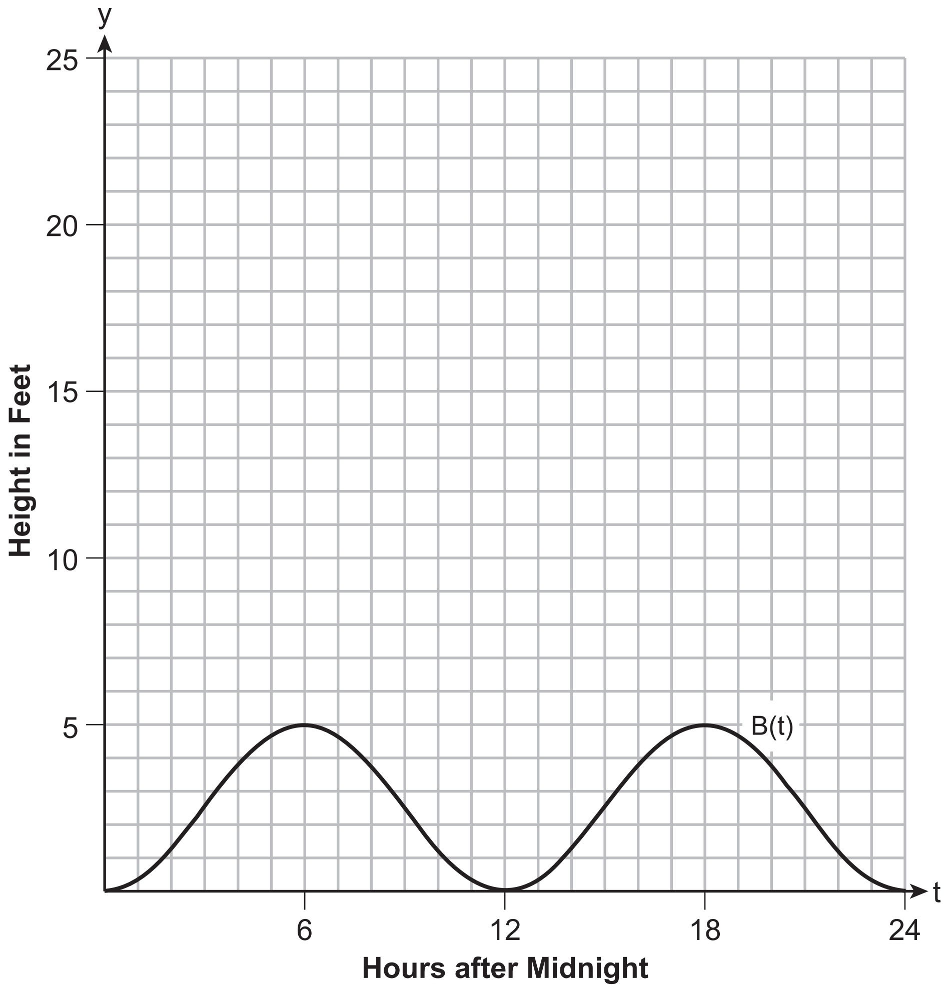
$B(t) = 5\cos\left(\frac{\pi}{6}t\right) + 12$

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \le t \le 24$.

State the height, in feet, of the low tide in Derby.

Question 37

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.



Score 1: The student stated the period correctly.

Question 37 continued

State the period of $B(t)$, in hours.

12

x	D(t)
0	24.5
1	23.428
2	20.5
3	16.5
4	12.5
5	9.5718
6	8.5
7	9.5718
8	12.5
9	16.5
10	20.5
11	23.428
12	24.5
13	23.428
14	20.5
15	16.5
16	12.5
17	9.5718
18	8.5
19	9.5718
20	12.5
21	16.5
22	20.5
23	23.428
24	24.5

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \le t \le 24$.

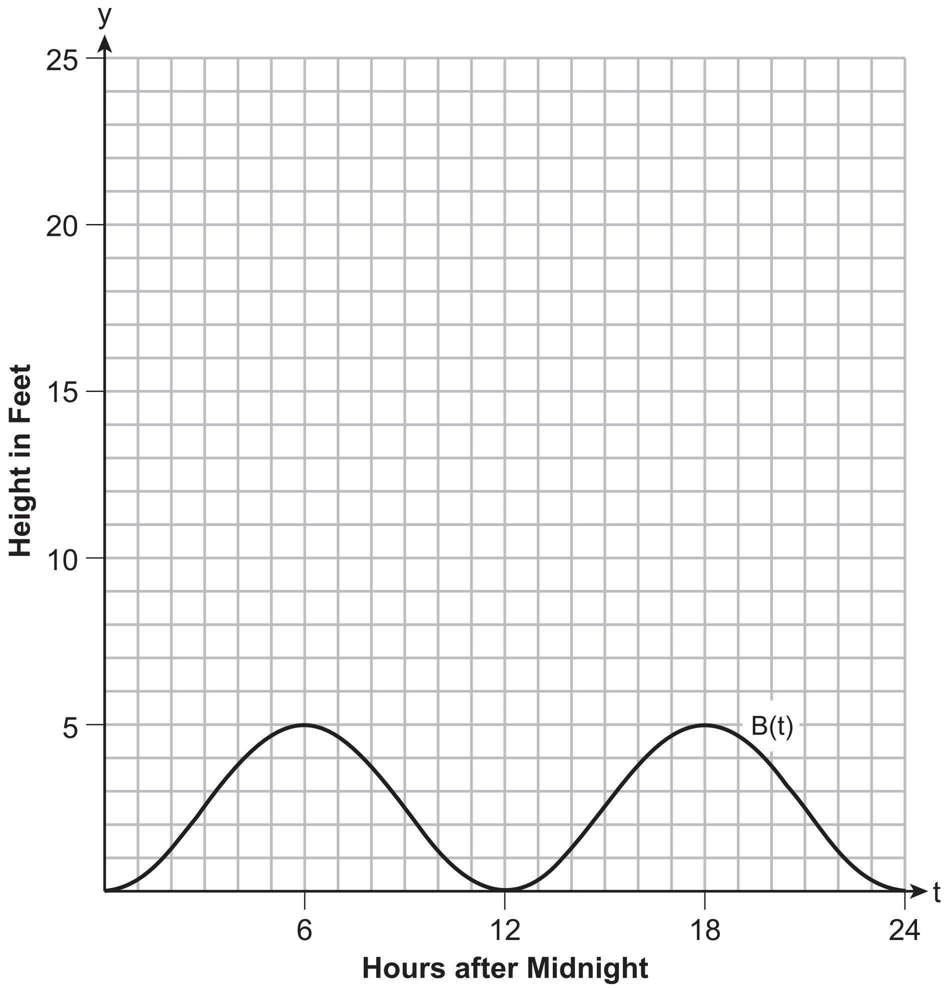
State the height, in feet, of the low tide in Derby.

$D(t) = 8\cos(\frac{\pi}{6}t) + 16.5$

$D(t) = 23.42820323t$

Question 37

37 The height, in feet, of the tides along the coastlines can be measured with water levels oscillating between low tide and high tide. The graph below shows the height of the tides, $y = B(t)$, in feet, in Daytona Beach, t hours after midnight on a day in July.



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

Question 37

Question 37 continued

State the period of $B(t)$, in hours.

$$\frac{5 \cdot P}{5} = \frac{2\pi}{5}$$

$$P = \frac{2\pi}{5}$$

Write an equation for $B(t)$ in the form $B(t) = a\cos(bt) + c$.

$$C = \frac{5+0}{2} = 2.5 \qquad 2.5\cos(5t) + 2.5$$

$$A = \frac{5+0}{2} = 2.5$$

In Derby, Australia, the height of the tide, in feet, can be modeled by the function $D(t) = 8\cos\left(\frac{\pi}{6}t\right) + 16.5$. On the grid provided on the previous page, graph $y = D(t)$ on the domain $0 \le t \le 24$.

State the height, in feet, of the low tide in Derby.