

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA I

Tuesday, June 4, 2024 — 9:15 a.m. to 12:15 p.m., only

MODEL RESPONSE SET

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Question 25

25 Solve $5(x - 2) \leq 3x + 20$ algebraically.

$$\begin{array}{r} 5x - 10 \leq 3x + 20 \\ \underline{-3x} \quad \underline{-3x} \end{array}$$

$$\begin{array}{r} 2x - 10 \leq 20 \\ \underline{+10} \quad \underline{+10} \end{array}$$

$$\begin{array}{r} 2x \leq 30 \\ \underline{2} \quad \underline{2} \end{array}$$

$$x \leq 15$$

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

Question 25

25 Solve $5(x - 2) \leq 3x + 20$ algebraically.

$$5x - 10 \leq 3x + 20$$

$$2x - 10 \geq +20$$

$$2x \geq 30$$

$$x \geq 15$$

Score 1: The student made an error writing their inequality sign.

Question 25

25 Solve $5(x - 2) \leq 3x + 20$ algebraically.

$$\begin{array}{r} 5x - 10 \leq 3x + 20 \\ -3x + 10 \quad -3x + 10 \\ \hline 2x \leq 30 \\ \hline x \leq 15 \end{array}$$

$$x = 15$$

Score 1: The student wrote the solution as an equation and not an inequality.

Question 25

25 Solve $5(x - 2) \leq 3x + 20$ algebraically.

$$\begin{array}{r} 5x - 10 \leq 3x + 20 \\ +10 \quad +10 \\ \hline 5x \leq 3x + 30 \\ -3x \quad -3x \\ \hline 2x \leq 30 \\ \frac{2x}{2} \leq \frac{30}{2} \\ x = 15 \end{array}$$

Score 0: The student made a transcription error and wrote the solution as an equation.

Question 26

26 Given $g(x) = x^3 + 2x^2 - x$, evaluate $g(-3)$.

$$g(-3) = (-3)^3 + 2(-3)^2 - (-3)$$
$$g(-3) = -27 + 18 + 3$$
$$g(-3) = -6$$

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

Question 26

26 Given $g(x) = x^3 + 2x^2 - x$, evaluate $g(-3)$.

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

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

Question 26

26 Given $g(x) = x^3 + 2x^2 - x$, evaluate $g(-3)$.

$$g(3) = 3^3 + 2(3)^2 - 3$$
$$g(3) = 42$$

Score 1: The student evaluated $g(3)$ instead of $g(-3)$.

Question 26

26 Given $g(x) = x^3 + 2x^2 - x$, evaluate $g(-3)$.

$$g(-3) = -3^3 + 2(-3)^2 - (-3)$$

$$g(-3) = -27 + 18 + 3$$

$$g(-3) = -6$$

$$\frac{-3}{-3} = \frac{-6}{-3}$$

$$g = 2$$

Score 1: The student found the correct answer, but continued with incorrect work.

Question 26

26 Given $g(x) = x^3 + 2x^2 - x$, evaluate $g(-3)$.

$$-27 - 9 - 3 = 16$$

Score 0: The student made multiple errors.

Question 27

27 Given the relation $R = \{(-1,1), (0,3), (-2,-4), (x,5)\}$.

State a value for x that will make this relation a function.

$$x = 1$$

Explain why your answer makes this a function.

Each input has exactly 1 output, so
-1 has the output 1, 0 has the output 3,
-2 has the output -4, and 1 has the
output 5.

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

Question 27

27 Given the relation $R = \{(-1,1), (0,3), (-2,-4), (x,5)\}$.

State a value for x that will make this relation a function.

$$x = 3$$

Explain why your answer makes this a function.

It would make the relation a function because none of the x values repeat

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

Question 27

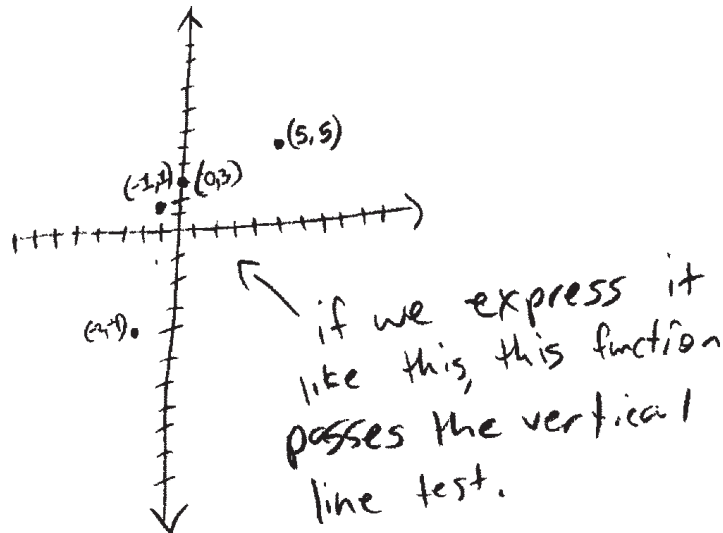
27 Given the relation $R = \{(-1,1), (0,3), (-2,-4), (x,5)\}$.

State a value for x that will make this relation a function.

$$x = 5$$

Explain why your answer makes this a function.

$$R = \{(-1,1), (0,3), (-2,-4), (5,5)\}$$



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

Question 27

27 Given the relation $R = \{(-1,1), (0,3), (-2,-4), (x,5)\}$.

State a value for x that will make this relation a function.

6

Explain why your answer makes this a function.

it makes a
line

Score 1: The student gave a correct value for x , but wrote an incorrect explanation.

Question 27

27 Given the relation $R = \{(-1,1), (0,3), (-2,-4), (x,5)\}$.

State a value for x that will make this relation a function.

-3

Explain why your answer makes this a function.

there isn't a -3 on any of the pairs, so it stays a function

Score 1: The student gave a correct value for x , but wrote an incomplete explanation.

Question 27

$$\begin{array}{ccc} x+2 & & \\ x+1 & y-1 & 11x+9 \\ \downarrow & & \\ x-2 & & x+1 \end{array}$$

27 Given the relation $R = \{(-1,1), (0,3), (-2,-4), (x,5)\}$.

State a value for x that will make this relation a function.

$$\boxed{-1}$$

Explain why your answer makes this a function.

It is a point on the line.

Score 0: The student did not show any correct work.

Question 28

28 A survey of 150 students was taken. It was determined that $\frac{2}{3}$ of the students play video games.

Of the students that play video games, 85 also use social media.

Of the students that do not play video games, 20% do not use social media.

Complete the two-way frequency table.

	Play Video Games	Do Not Play Video Games	Total
Social Media	85	40	125
No Social Media	15	10	25
Total	100	50	150

$$\frac{2}{3} \cdot 150 = 100 \text{ play video games}$$

50 do not play video games

$$100 - 85 = 15 \text{ no social media but play video games}$$

$$20\% \times 50 = 10 \text{ do not play video games no social media}$$

$$50 - 10 = 40 \text{ do not play video games but use social media}$$

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

Question 28

28 A survey of 150 students was taken. It was determined that $\frac{2}{3}$ of the students play video games.

Of the students that play video games, 85 also use social media.

Of the students that do not play video games, 20% do not use social media.

Complete the two-way frequency table.

	Play Video Games	Do Not Play Video Games	Total
Social Media	85	40	125
No Social Media	15	10	25
Total	100	50	150

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

Question 28

28 A survey of 150 students was taken. It was determined that $\frac{2}{3}$ of the students play video games.

Of the students that play video games, 85 also use social media.

Of the students that do not play video games, 20% do not use social media.

Complete the two-way frequency table.

	Play Video Games	Do Not Play Video Games	Total
Social Media	85	20	105
No Social Media	15	30	45
Total	100	50	150

Score 1: The student found 100.

Question 28

28 A survey of 150 students was taken. It was determined that $\frac{2}{3}$ of the students play video games.

Of the students that play video games, 85 also use social media.

Of the students that do not play video games, 20% do not use social media.

Complete the two-way frequency table.

	Play Video Games	Do Not Play Video Games	Total
Social Media	85	10	95
No Social Media	15	40	55
Total	100	50	150

.20

Score 1: The student reversed the number of students in the “do not play video games” column.

Question 28

28 A survey of 150 students was taken. It was determined that $\frac{2}{3}$ of the students play video games.

Of the students that play video games, 85 also use social media.

Of the students that do not play video games, 20% do not use social media.

Complete the two-way frequency table.

	Play Video Games	Do Not Play Video Games	Total
Social Media	85	1	
No Social Media	20%		
Total			

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

Question 29

29 Use the method of completing the square to determine the exact values of x for the equation $x^2 + 10x - 30 = 0$.

$$\begin{aligned}x^2 + 10x - 30 &= 0 \\ \left(x^2 + 10x + \frac{25}{2}\right) - 30 - \frac{25}{2} &= 0 \\ (x+5)^2 - 55 &= 0 \\ \sqrt{(x+5)^2} &= \pm\sqrt{55} \\ x+5 &= \pm\sqrt{55} \\ -5 & \quad -5 \\ \hline x &= -5 \pm \sqrt{55} \\ x &= -5 + \sqrt{55} \quad x = -5 - \sqrt{55}\end{aligned}$$

1
4
9
16
25
36
49

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

Question 29

29 Use the method of completing the square to determine the exact values of x for the equation $x^2 + 10x - 30 = 0$.

$$\begin{aligned}x^2 + 10x - 30 &= 0 \\ &\quad +30 \quad +30 \\x^2 + 10x &= 30 \\ \left(\frac{b}{2}\right)^2 \rightarrow b=10 \rightarrow \left(\frac{10}{2}\right)^2 \rightarrow 5^2 \rightarrow 25 \\x^2 + 10x + 25 &= 30 + 25 \\x^2 + 10x + 25 &= 55 \\ \sqrt{(x + 5)^2} &= \sqrt{55} \\x + 5 &= \pm \sqrt{55} \\x &= \sqrt{55} - 5 \\x &= -\sqrt{55} - 5\end{aligned}$$

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

Question 29

29 Use the method of completing the square to determine the exact values of x for the equation $x^2 + 10x - 30 = 0$.

$$\begin{aligned} & \quad \quad \quad +30+30 & \quad \quad \quad \left(\frac{10}{2}\right)^2 \\ x^2 + 10x &= 30 \\ x^2 + 10x + \underline{25} &= 30 + \underline{25} \\ x^2 + 10x + 25 &= 55 \\ \sqrt{(x-5)^2} &= \sqrt{55} \\ x-5 &= \pm \sqrt{55} \\ \quad +5 & \quad +5 \\ x &= 5 \pm \sqrt{55} \end{aligned}$$

Score 1: The student incorrectly factored $x^2 + 10x + 25$ by writing $(x - 5)^2$.

Question 29

29 Use the method of completing the square to determine the exact values of x for the equation $x^2 + 10x - 30 = 0$.

$$x^2 + 10x - 30 = 0$$

$$x^2 + 10x = 30$$

$$(x+5)^2 = \underline{25} + 30$$

$$(x+5)^2 = 55$$

$$x+5 = \pm\sqrt{55}$$

$$x = -5 \pm \sqrt{55}$$

$$x = -5 \pm 7.416$$

$$\{ 2.416, -12.416 \}$$

$$\frac{-10 \pm \sqrt{100 - 4(1)(-30)}}{2}$$

$$\frac{-10 \pm 14.832}{2}$$

$$\frac{-10 \pm \sqrt{220}}{2}$$

Score 1: The student found $x = -5 \pm \sqrt{55}$, but expressed their answers as decimals.

Question 29

29 Use the method of completing the square to determine the exact values of x for the equation $x^2 + 10x - 30 = 0$.

$$x^2 + 10x - 30 = 0$$

$A = 1$
 $B = 10$
 $C = -30$

$$ax^2 + bx + c$$

30	10
9	5
-10.5	
15.2	
-10.5	

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$x = \frac{-(10) \pm \sqrt{(10)^2 - 4(1)(-30)}}{4(1)}$$

$$x = \frac{-10 \pm \sqrt{920}}{4}$$

Score 0: The student used a method other than completing the square and made a computational error.

Question 29

29 Use the method of completing the square to determine the exact values of x for the equation $x^2 + 10x - 30 = 0$.

$$\begin{aligned} & + 30 \\ x^2 + 10x + 100 &= 30 + 100 \\ \sqrt{(x+5)^2} &= \sqrt{130} \\ x+5 &= \pm\sqrt{130} \\ -5 & \quad -5 \\ \boxed{x = -5 \pm \sqrt{130}} \end{aligned}$$

1×30
 2×15
 3×10
 5×6

$(10)^2 = 100$

Score 0: The student made two errors by squaring 10 and factoring their trinomial incorrectly.

Question 30

30 Factor $20x^3 - 45x$ completely.

$$20x^3 - 45x$$

$$5x(4x^2 - 9)$$

$$5x(2x+3)(2x-3)$$

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

Question 30

30 Factor $20x^3 - 45x$ completely.

$$20x^3 - 45x$$
$$5x(4x^2 - 9)$$
$$5x \left(\begin{array}{l} 2x - 3 = 0 \\ + \quad 3 \\ \hline 2x = 3 \\ x = \frac{3}{2} \end{array} \right) \left(\begin{array}{l} 2x + 3 \\ - \quad 3 \\ \hline 2x = -3 \\ x = -\frac{3}{2} \end{array} \right)$$

Score 1: The student factored correctly, but then solved for x .

Question 30

30 Factor $20x^3 - 45x$ completely.

$$20x^3 - 0 - 45x$$

$$\begin{aligned} a &= 20 \\ b &= 0 \\ c &= -45 \end{aligned}$$

$$-0 \pm \frac{\sqrt{(0)^2 - 4(20)(-45)}}{2(20)}$$

$$-0 \pm \frac{\sqrt{3600}}{40}$$

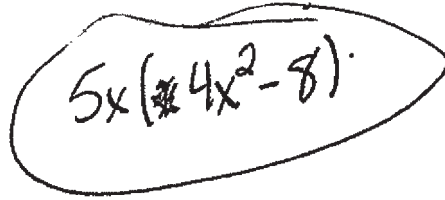
$$\frac{-0 + \sqrt{3600}}{40}, \quad \frac{-0 - \sqrt{3600}}{40}$$

$$\boxed{x = 1.5, -1.5}$$

Score 0: The student incorrectly applied the quadratic formula.

Question 30

30 Factor $20x^3 - 45x$ completely.



$5x(4x^2 - 8)$

Score 0: The student made a computational error and no further work was shown.

Question 31

31 Graph the following system of equations on the set of axes below.

$$4 = 5^2 - 2(5) - 6$$

$$4 = 25 - 10 - 6$$

$$4 = 4$$

✓

$$4 = 5 - 1$$

$$4 = 4$$

✓

$$y = x^2 - 3x - 6$$

$$y = x - 1$$

$$-2 = -1 - 1$$

$$-2 = -2$$

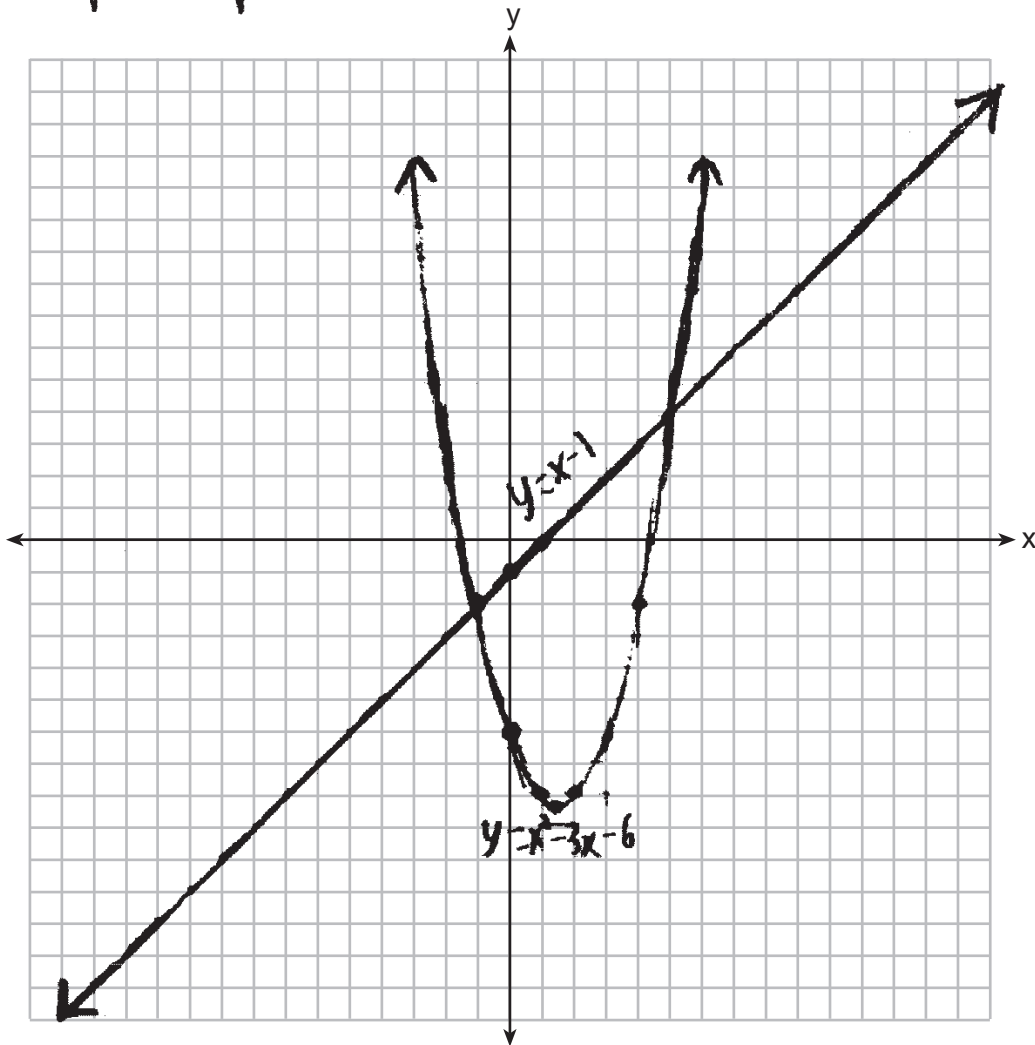
✓

$$-2 = (-1)^2 - 3(-1) - 6$$

$$-2 = 1 + 3 - 6$$

$$-2 = -2$$

✓



State the coordinates of all solutions.

$(-1, -2)$ and $(5, 4)$

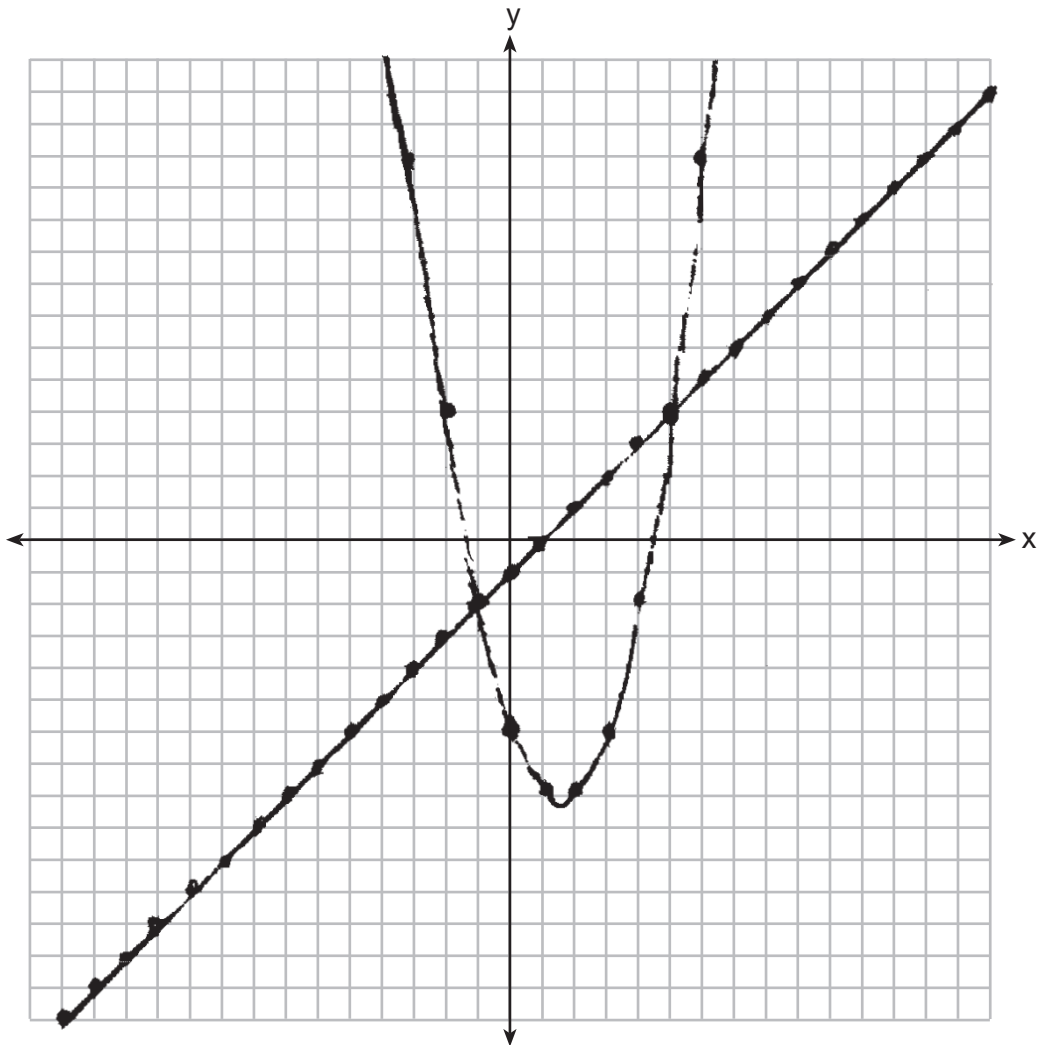
Score 4: The student gave a complete and correct response.

Question 31

31 Graph the following system of equations on the set of axes below.

$$y = x^2 - 3x - 6$$

$$y = x - 1$$



State the coordinates of all solutions.

$$(5, 4) \quad (-1, -2)$$

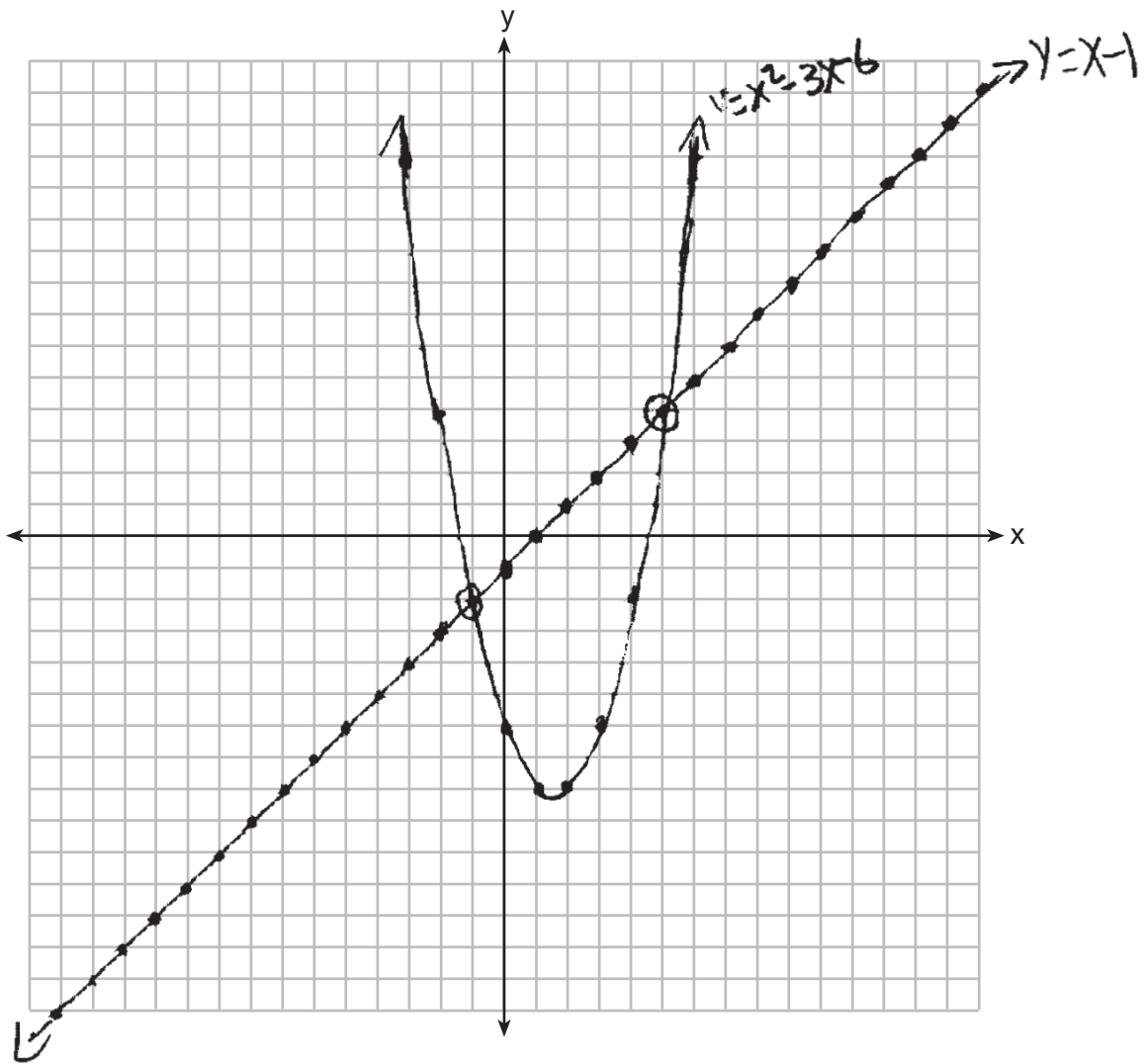
Score 4: The student gave a complete and correct response.

Question 31

31 Graph the following system of equations on the set of axes below.

$$y = x^2 - 3x - 6$$

$$y = x - 1$$



State the coordinates of all solutions.

$(5, 4)$ $(-2, -1)$

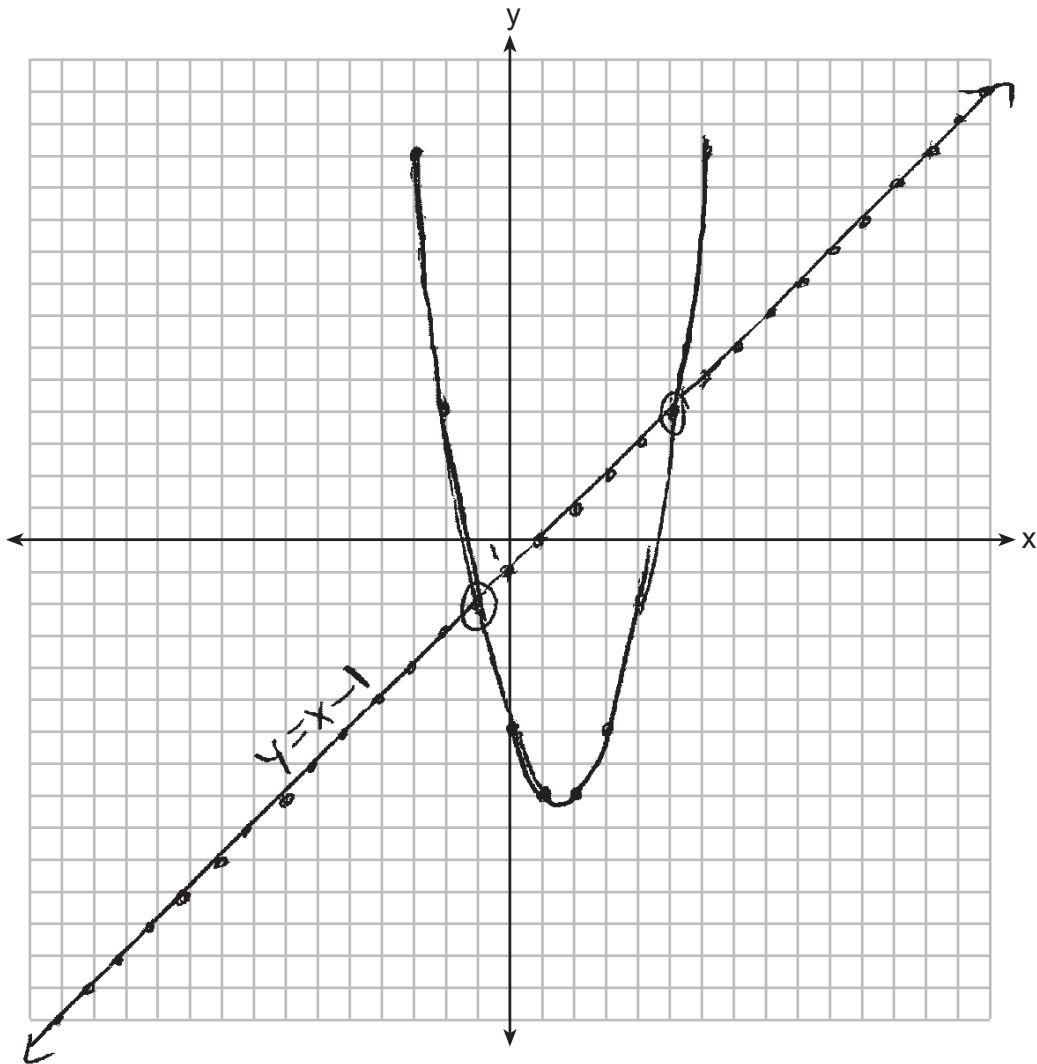
Score 3: The student stated only one solution correctly.

Question 31

31 Graph the following system of equations on the set of axes below.

$$y = x^2 - 3x - 6$$

$$y = x - 1$$



State the coordinates of all solutions.

$$(-1, -2) \text{ and } (5, 4)$$

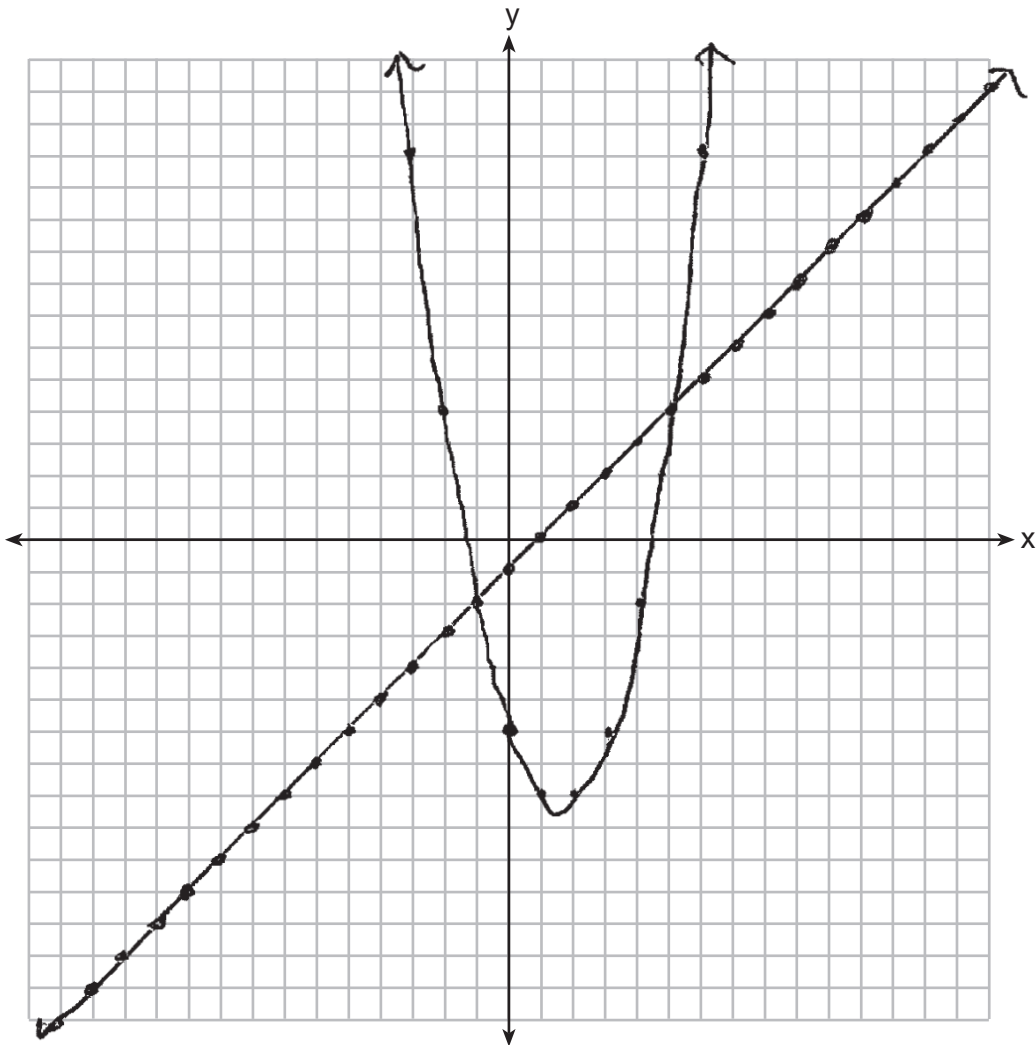
Score 3: The student made a graphing error by not including arrows on the graph of $y = x^2 - 3x - 6$.

Question 31

31 Graph the following system of equations on the set of axes below.

$$y = x^2 - 3x - 6$$

$$y = x - 1$$



State the coordinates of all solutions.

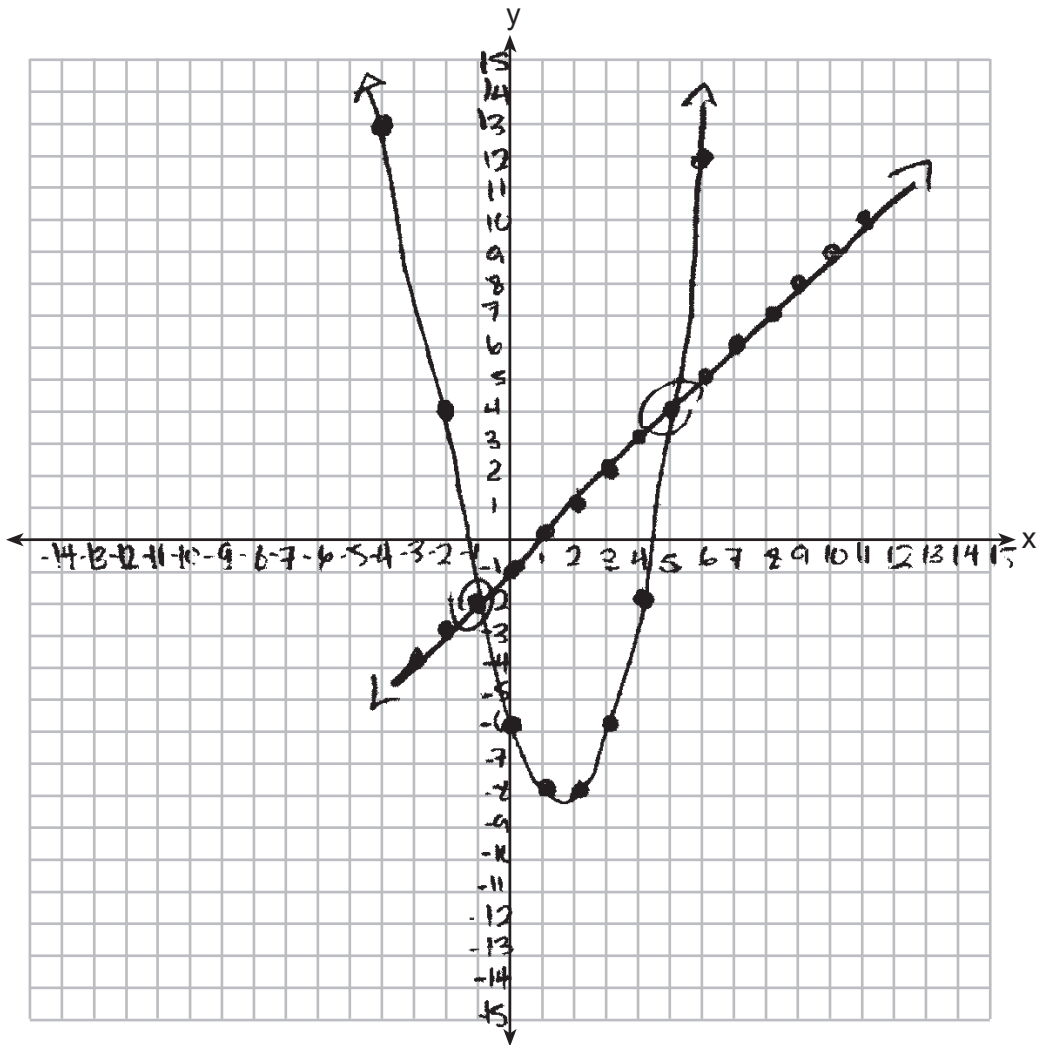
Score 2: The student did not state the coordinates of the solutions.

Question 31

31 Graph the following system of equations on the set of axes below.

$$y = x^2 - 3x - 6$$

$$y = x - 1$$



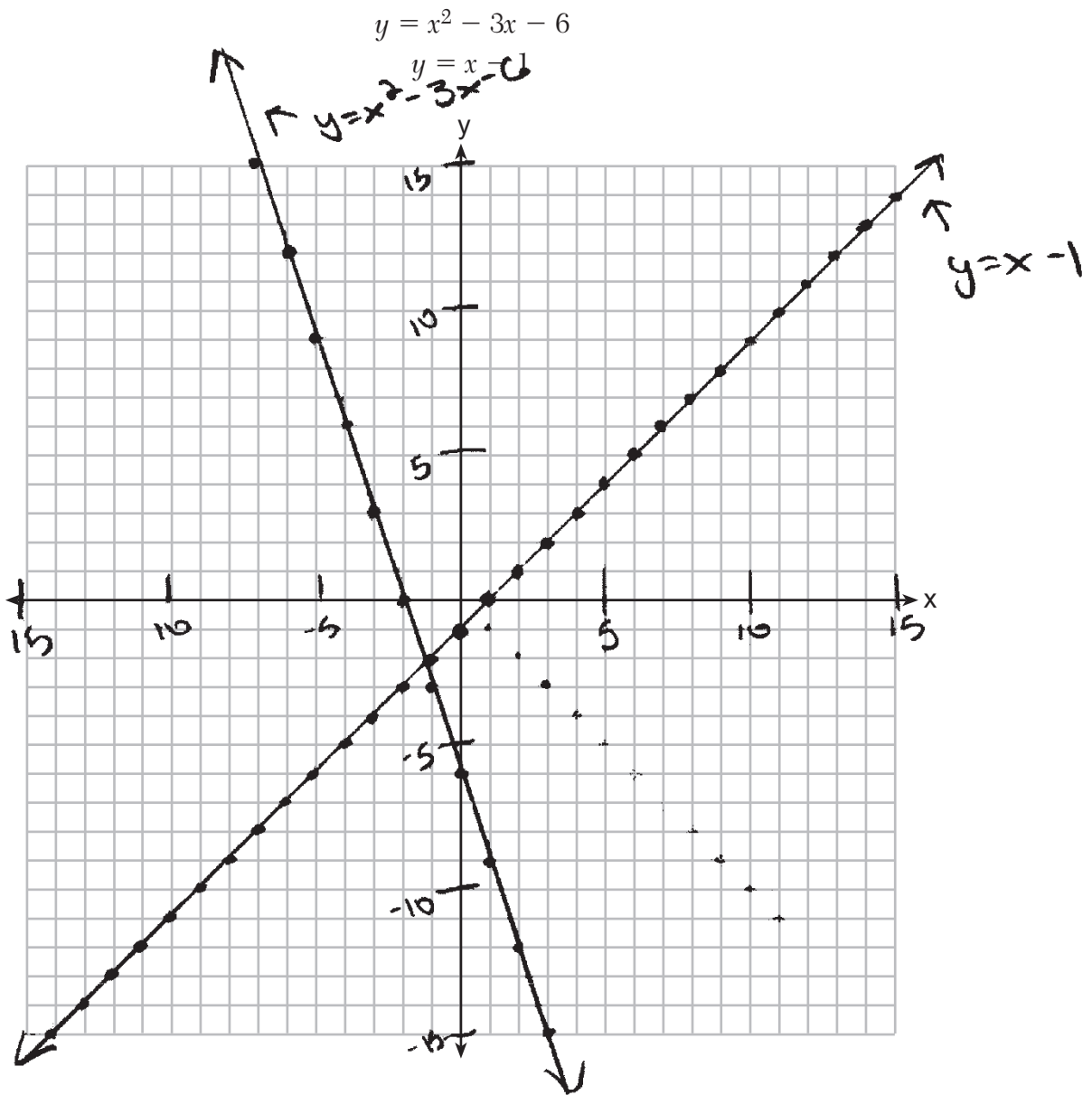
State the coordinates of all solutions.

$(5, 4)$ and $(-1, 2)$

Score 2: The student made one graphing error at $(-4, 13)$, and one coordinate pair was stated incorrectly.

Question 31

31 Graph the following system of equations on the set of axes below.



State the coordinates of all solutions.

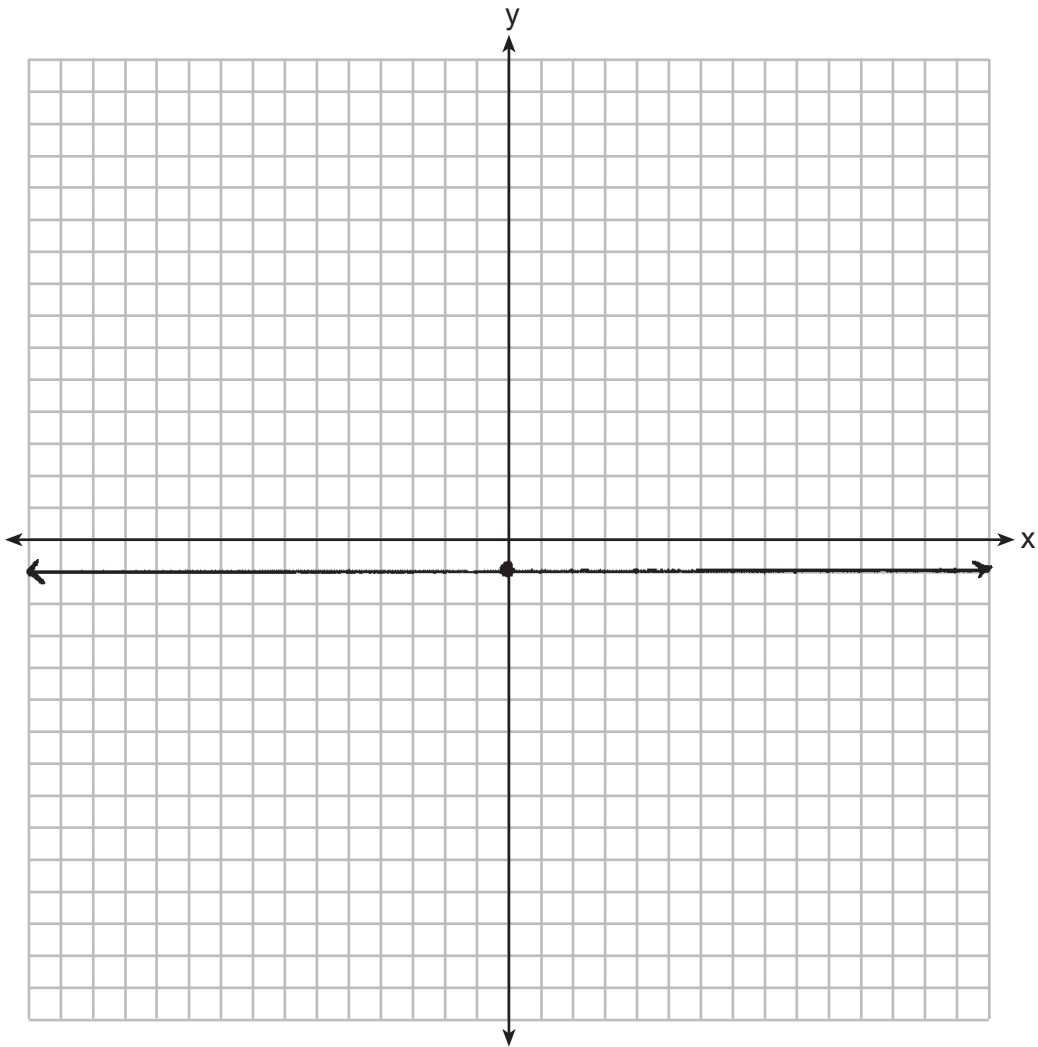
Score 1: The student only graphed $y = x - 1$ correctly.

Question 31

31 Graph the following system of equations on the set of axes below.

$$y = x^2 - 3x - 6$$

$$y = x - 1$$



State the coordinates of all solutions.

$(-1, -2)$

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

Question 32

32 The table below shows the amount of money a popular movie earned, in millions of dollars, during its first six weeks in theaters.

Week (x)	1	2	3	4	5	6
Dollars Earned, in Millions (y)	185	150	90	50	25	5

Write the linear regression equation for this data set, rounding all values to the *nearest hundredth*.

$$\begin{aligned}a &= -37.57 \\ b &= 215.67 \\ r &= -.98\end{aligned}$$

$$y = -37.57x + 215.67$$

State the correlation coefficient to the *nearest hundredth*.

$$-.98$$

State what this correlation coefficient indicates about the linear fit of the data.

There is a strong negative correlation between the weeks & how much money is earned.

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

Question 32

32 The table below shows the amount of money a popular movie earned, in millions of dollars, during its first six weeks in theaters.

Week (x)	1	2	3	4	5	6
Dollars Earned, in Millions (y)	185	150	90	50	25	5

Write the linear regression equation for this data set, rounding all values to the *nearest hundredth*.

$$y = mx + b$$
$$y = -37.57x + 215.67$$

State the correlation coefficient to the *nearest hundredth*.

$$r\text{-value} = 0.98$$

State what this correlation coefficient indicates about the linear fit of the data.

The correlation coefficient indicates a strong positive correlation, because the coefficient is close to 1.

Score 3: The student wrote an incorrect correlation coefficient, but gave an appropriate indication about the linear fit.

Question 32

32 The table below shows the amount of money a popular movie earned, in millions of dollars, during its first six weeks in theaters.

Week (x)	1	2	3	4	5	6
Dollars Earned, in Millions (y)	185	150	90	50	25	5

Write the linear regression equation for this data set, rounding all values to the *nearest hundredth*.

$$y = -37.57x + 215.67$$

State the correlation coefficient to the *nearest hundredth*.

$$-37.57$$

State what this correlation coefficient indicates about the linear fit of the data.

It indicates how much the dollars earned in millions changes each week.

Score 2: The student wrote a correct linear regression equation, but no further correct work was shown.

Question 32

32 The table below shows the amount of money a popular movie earned, in millions of dollars, during its first six weeks in theaters.

Week (x)	1	2	3	4	5	6
Dollars Earned, in Millions (y)	185	150	90	50	25	5

Write the linear regression equation for this data set, rounding all values to the *nearest hundredth*.

$$a = -37.57142857 = -37.57$$

$$b = 215.6666667 = 215.67$$

State the correlation coefficient to the *nearest hundredth*.

$$-.98$$

State what this correlation coefficient indicates about the linear fit of the data.

That every week, the dollars earned in millions decreases by $-.98$.

Score 2: The student did not write a regression equation and wrote an incorrect indication about the linear fit.

Question 32

32 The table below shows the amount of money a popular movie earned, in millions of dollars, during its first six weeks in theaters.

Week (x)	1	2	3	4	5	6
Dollars Earned, in Millions (y)	185	150	90	50	25	5

Write the linear regression equation for this data set, rounding all values to the *nearest hundredth*.

$$y = -37.6x + 215.7$$

State the correlation coefficient to the *nearest hundredth*.

State what this correlation coefficient indicates about the linear fit of the data.

Score 1: The student made a rounding error by rounding to the tenths place.

Question 32

32 The table below shows the amount of money a popular movie earned, in millions of dollars, during its first six weeks in theaters.

Week (x)	1	2	3	4	5	6
Dollars Earned, in Millions (y)	185	150	90	50	25	5

Write the linear regression equation for this data set, rounding all values to the *nearest hundredth*.

$$y = ax + b$$
$$y = 37.5x + 226.17$$

State the correlation coefficient to the *nearest hundredth*.

State what this correlation coefficient indicates about the linear fit of the data.

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

Question 33

33 Use the quadratic formula to solve the equation $3x^2 - 10x + 5 = 0$. Express the answer in simplest radical form.

$$\begin{aligned} a &= 3 \\ b &= -10 \\ c &= 5 \end{aligned}$$

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

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(3)(5)}}{2(3)}$$

$$x = \frac{10 \pm \sqrt{100 - 60}}{6}$$

$$x = \frac{10 \pm \sqrt{40}}{6}$$

$$x = \frac{10 \pm 2\sqrt{10}}{6}$$

$$\begin{aligned} \sqrt{40} &= \sqrt{4 \cdot 10} \\ &= 2\sqrt{10} \end{aligned}$$

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

Question 33

33 Use the quadratic formula to solve the equation $3x^2 - 10x + 5 = 0$. Express the answer in simplest radical form.

$$\begin{array}{r|l} 40 & 2 \\ 20 & 2 \\ 10 & 2 \\ 5 & 5 \end{array}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad \begin{array}{l} a=3 \\ b=-10 \\ c=5 \end{array}$$

$$x = \frac{10 \pm \sqrt{100 - 60}}{6}$$

$$x = \frac{10 \pm \sqrt{40}}{6}$$

$$x = \frac{5 \cancel{10} \pm \cancel{2}\sqrt{10}}{\cancel{6}_3}$$

$$\boxed{x = \frac{5 \pm \sqrt{10}}{3}}$$

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

Question 33

33 Use the quadratic formula to solve the equation $3x^2 - 10x + 5 = 0$. Express the answer in simplest radical form.

$$\begin{aligned}
 & \begin{matrix} a & b & c \\ 3x^2 - 10x + 5 = 0 \end{matrix} \quad \text{quadratic formula} = \\
 & \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 & = \frac{10 \pm \sqrt{10^2 - 4 \cdot 3 \cdot 5}}{2 \cdot 3} \\
 & = \frac{10 \pm \sqrt{100 - 60}}{6} \\
 & = \frac{10 \pm \sqrt{40}}{6} \\
 & = \frac{10 \pm 2\sqrt{10}}{6} \qquad \frac{10 \pm 0.32 \dots}{6} \\
 & \boxed{= 2.72, 0.61}
 \end{aligned}$$

Score 3: The student converted $\frac{10 \pm 2\sqrt{10}}{6}$ to decimals.

Question 33

33 Use the quadratic formula to solve the equation $3x^2 - 10x + 5 = 0$. Express the answer in simplest radical form.

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

$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(3)(5)}}{2(3)}$$

$$x = \frac{5 \cancel{10} \pm \sqrt{100 - 60}}{\cancel{6}3}$$

$$x = \frac{5 \pm \sqrt{40}}{3}$$

$$x = \frac{5 \pm \sqrt{4 \cdot 10}}{3}$$

$$x = \frac{5 \pm 2\sqrt{10}}{3}$$

$$x = \frac{5 - 2\sqrt{10}}{3}$$

or

$$x = \frac{5 + 2\sqrt{10}}{3}$$

Score 3: The student made a simplification error.

Question 33

33 Use the quadratic formula to solve the equation $3x^2 - 10x + 5 = 0$. Express the answer in simplest radical form.

$$\begin{array}{ccc} A & B & C \\ 3x^2 - 10x + 5 = 0 \end{array}$$

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

$$X = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(3)(5)}}{2(3)}$$

$$X = \frac{10 \pm \sqrt{100 - 60}}{6}$$

$$X = \frac{10 \pm \sqrt{40}}{6}$$

$$X = \frac{10}{6} \pm \frac{\sqrt{40}}{6}$$

$$X = 1.67 \pm 1.05$$

$$X = 1.67 + 1.05$$

$$X = 1.67 - 1.05$$

$$X = 2.72$$

$$X = .62$$

Score 2: The student found $x = \frac{10 \pm \sqrt{40}}{6}$.

Question 33

33 Use the quadratic formula to solve the equation $3x^2 - 10x + 5 = 0$. Express the answer in simplest radical form.

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

$$x = \frac{-(-10) \pm \sqrt{10^2 - 4(3)(5)}}{2(3)}$$

$$x = \frac{10 \pm \sqrt{40}}{6}$$

$$x = \frac{10 \pm 2\sqrt{10}}{6}$$

$$x = \frac{10 \pm 4\sqrt{5}}{6}$$

$$\left(\frac{6 - \sqrt{5}}{6} \right) \quad \left(\frac{14\sqrt{5}}{6} \right)$$

Score 2: The student found $x = \frac{10 \pm \sqrt{40}}{6}$, but then made multiple simplification errors.

Question 33

33 Use the quadratic formula to solve the equation $3x^2 - 10x + 5 = 0$. Express the answer in simplest radical form.

$$\begin{aligned} a &= 3 \\ b &= -10 \\ c &= 5 \end{aligned} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(3)(5)}}{2(3)}$$
$$x = \frac{20 \pm \sqrt{40}}{6}$$
$$x = 4.4$$
$$x = 2.3$$

Score 1: The student made a correct substitution into the quadratic formula.

Question 33

33 Use the quadratic formula to solve the equation $3x^2 - 10x + 5 = 0$. Express the answer in simplest radical form.

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

$$X = \frac{10 \pm \sqrt{10^2 - 4(3)(5)}}{2(3)}$$

$$X = \frac{10 \pm -160}{6}$$

$$X = \frac{10 + -160}{6} = \boxed{-25}$$

$$X = \frac{10 - -160}{6} = \boxed{28.3}$$

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

Question 34

34 Graph the system of inequalities on the set of axes below.

$$3y + 2x \leq 15$$

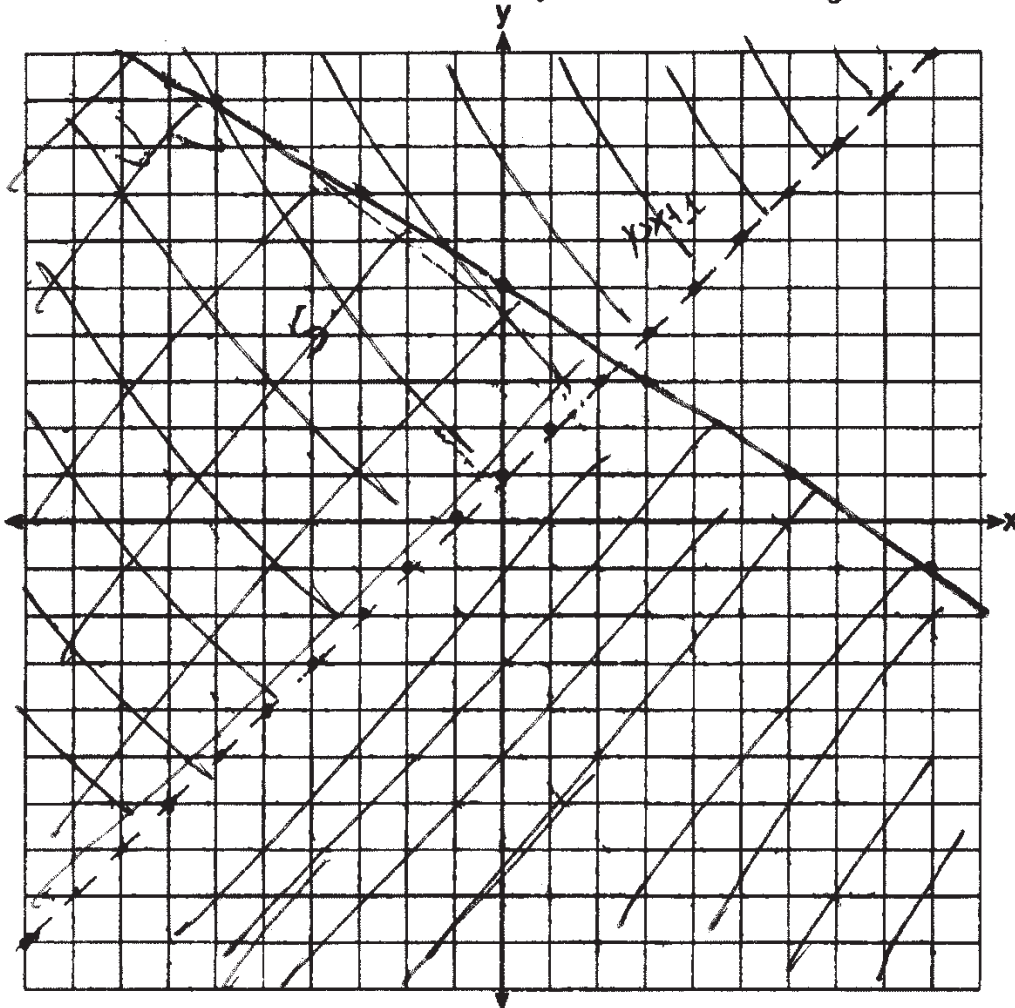
$$y - x \geq 12$$

$$y > x + 4$$

$$3y + 2x \leq 15$$

$$\frac{3y \leq -2x + 15}{3}$$

$$y \leq -\frac{2}{3}x + 5$$



State the coordinates of a point in the solution to this system. Justify your answer.

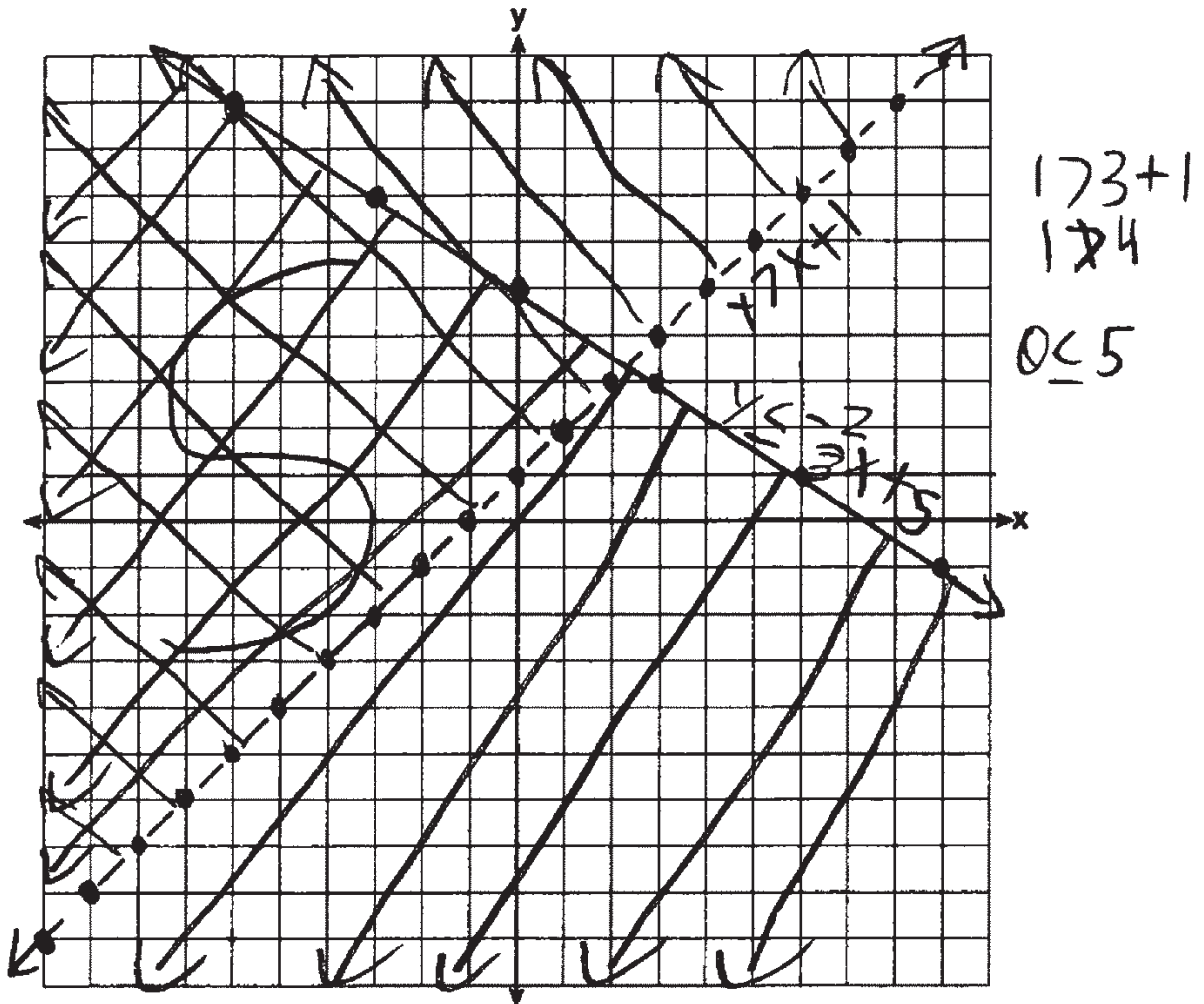
$(-8, 3)$. This point is in the area where the 2 shaded sections overlap.

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

Question 34

34 Graph the system of inequalities on the set of axes below.

$$\begin{aligned}
 3y + 2x &\leq 15 & 3y &\leq -2x + 15 \\
 y - x &> 1 & y &> x + 1 & y &\leq -\frac{2}{3}x + 5
 \end{aligned}$$



State the coordinates of a point in the solution to this system. Justify your answer.

$(-9, 1)$ $(-9, 1)$ is in the solution set
 on the graph and works out
 in both inequalities

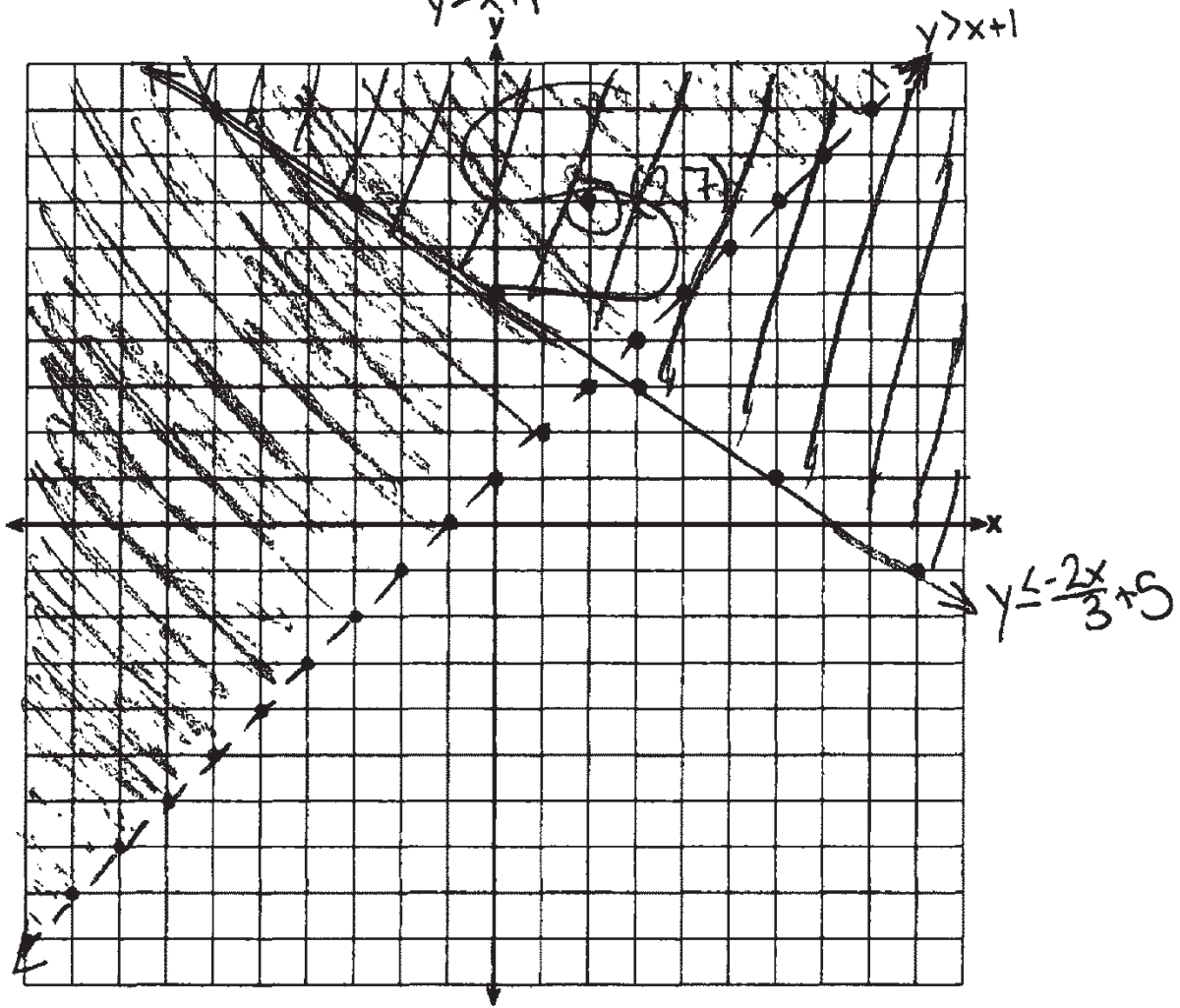
$$\begin{aligned}
 1 &\leq -\frac{2}{3}(-9) + 5 & 1 &> -9 + 1 \\
 1 &\leq 11 & 1 &> -8
 \end{aligned}$$

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

Question 34

34 Graph the system of inequalities on the set of axes below.

$$\begin{aligned} 3y + 2x &\leq 15 \\ y - x &> 1 \\ y &> x + 1 \end{aligned}$$
$$\begin{aligned} 3y + 2x &\leq 15 \\ -2x &-2x \\ \hline 3y &\leq -2x + 15 \\ \frac{3y}{3} &\leq \frac{-2x + 15}{3} = y \leq \frac{-2x}{3} + 5 \end{aligned}$$



State the coordinates of a point in the solution to this system. Justify your answer.

(2,7) is in the shaded region of the solution!

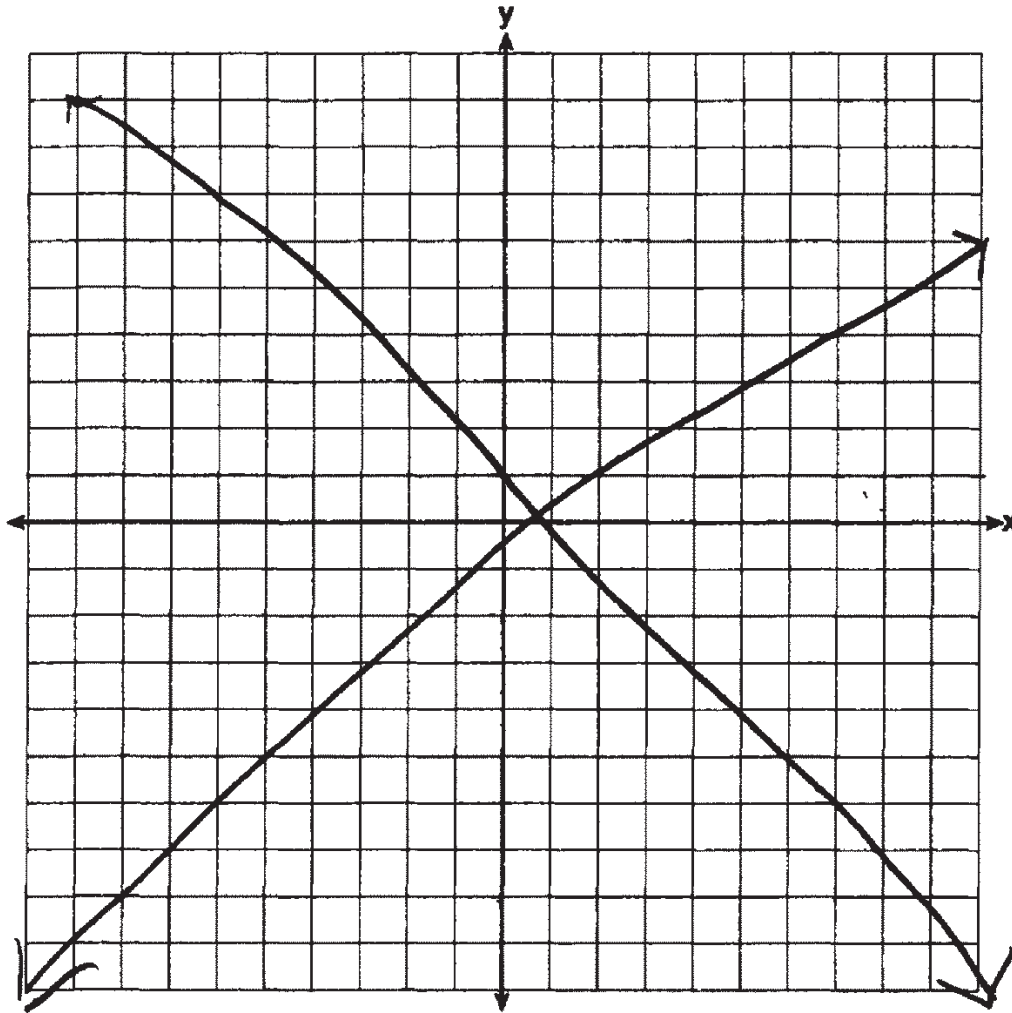
Score 3: The student shaded the region for $3y + 2x \leq 15$ incorrectly.

Question 34

34 Graph the system of inequalities on the set of axes below.

$$3y + 2x \leq 15$$

$$y - x > 1$$



State the coordinates of a point in the solution to this system. Justify your answer.

$(1, 4)$

$$3 \cdot 4 + 2 \cdot 1 = 14 \leq 15$$

$$4 - 1 = 3 > 1$$

Score 2: The student showed that $(1, 4)$ lies in the solution set.

Question 34

34 Graph the system of inequalities on the set of axes below.

$$3y + 2x \leq 15$$

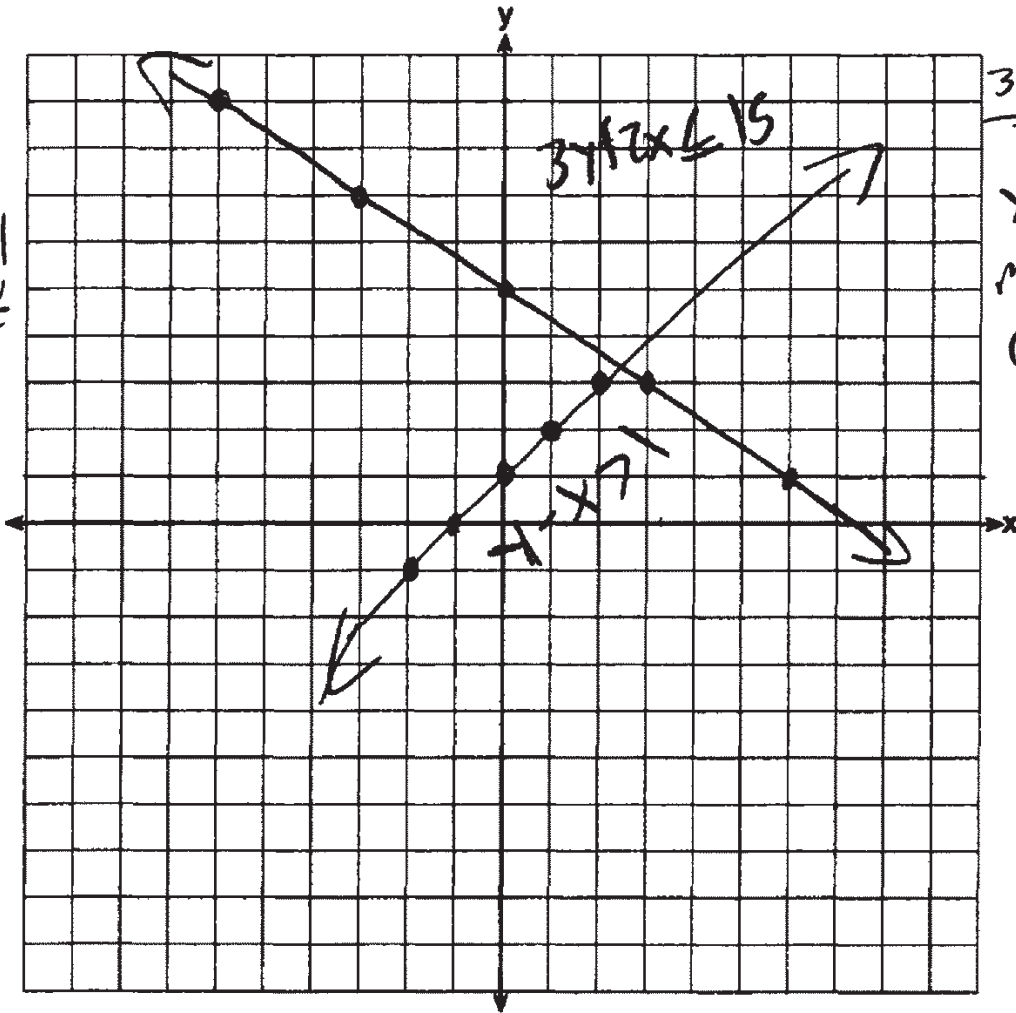
$$y - x > 1$$

$$\frac{y - x > 1}{+x \quad +x}$$

$$y > x + 1$$

$$m = \frac{1}{1} \rightarrow 1$$

$$(0, 1)$$



$$\frac{3y + 2x \leq 15}{-2x \quad -2x}$$

$$\frac{3y \leq -2x + 15}{3 \quad 3 \quad 3}$$

$$y \leq \frac{-2}{3}x + 5$$

$$m = \frac{-2}{3} \rightarrow -\frac{2}{3}$$

$$(0, 5)$$

State the coordinates of a point in the solution to this system. Justify your answer.

$$(1, 2) \quad 3(2) + 2(1) \leq 15$$

$$6 + 2 \leq 15$$

$$8 \leq 15 \checkmark$$

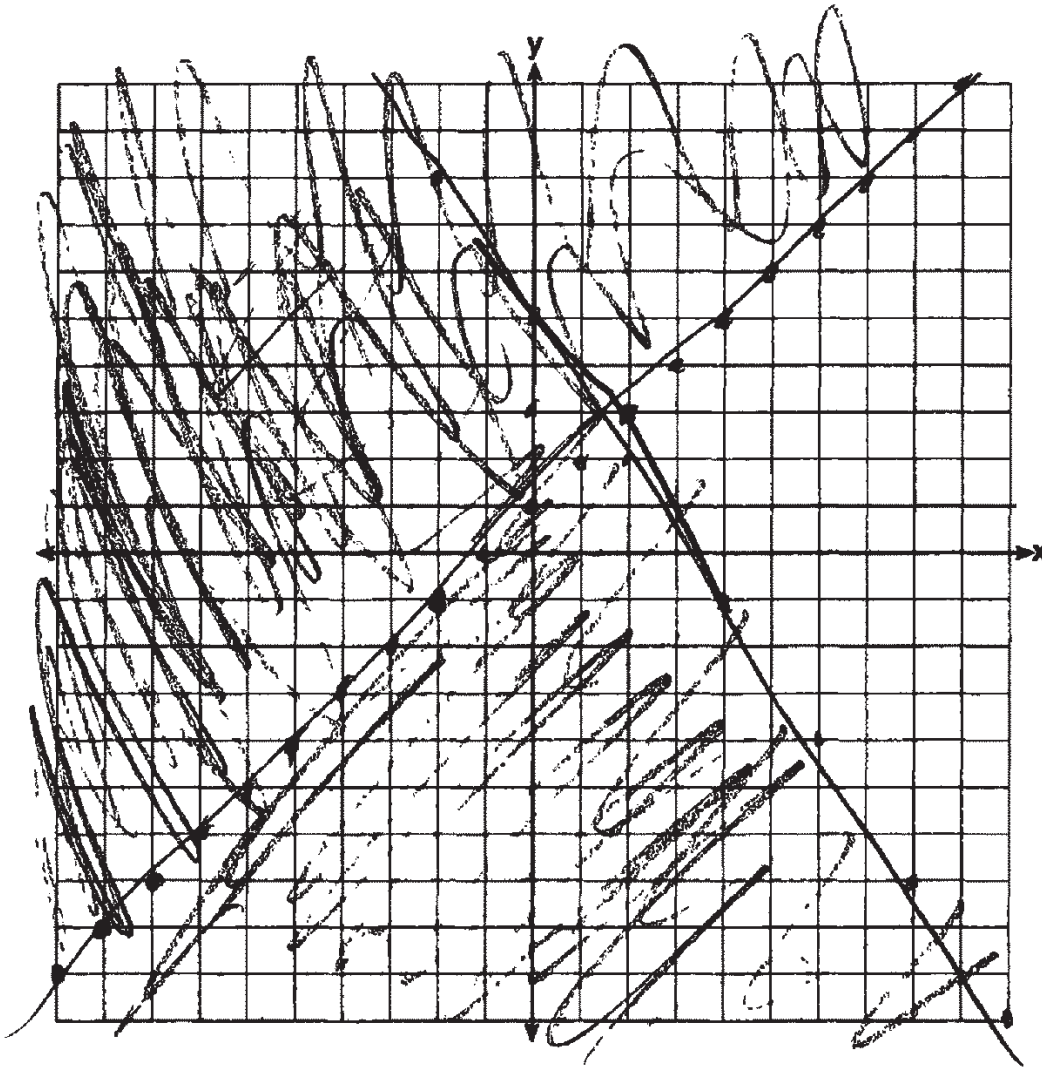
Score 1: The student graphed two equations instead of a system of inequalities.

Question 34

34 Graph the system of inequalities on the set of axes below.

$$3y + 2x \leq 15$$

$$y - x > 1$$



State the coordinates of a point in the solution to this system. Justify your answer.

$(3, 2)$ where the
lines intersect

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

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

$$\begin{aligned} 4x + 2y &= 15.50 \\ 3x + 5y &= 18.10 \end{aligned}$$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25.

Is Courtney correct? Justify your answer.

$$4(2.75) + 2(2.25) = 15.50 \quad 3(2.75) + 5(2.25) = 18.10$$

$$11 + 4.5 = 15.5$$

$$8.25 + 11.25 \neq 18.10$$

Courtney is incorrect since when you plug in 2.75 and 2.25, they are not solutions for both equations.

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$4x + 2y = 15.50 \Rightarrow y = -2x + 7.75$$

$$3x + 5y = 18.10$$

$$3(2.95) + 5y = 18.10$$

$$8.85 + 5y = 18.10$$

$$\begin{array}{r} 8.85 + 5y = 18.10 \\ -8.85 \\ \hline 5y = 9.25 \end{array}$$

$$\frac{5y = 9.25}{5} \quad \boxed{y = 1.85}$$

$$3x + 5(-2x + 7.75) = 18.10$$

$$3x - 10x + 38.75 = 18.10$$

$$-7x + 38.75 = 18.10$$

$$-38.75 \quad -38.75$$

$$-7x = -20.65$$

$$\begin{array}{r} -7x = -20.65 \\ \uparrow \div -7 \\ \hline \end{array}$$

$$\boxed{x = 2.95}$$

A latte costs \$2.95
A donut costs \$1.85

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

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

$$\begin{aligned}4x + 2y &= 15.50 \\3x + 5y &= 18.10\end{aligned}$$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25. Is Courtney correct? Justify your answer.

No, one donut costs \$1.85 and one latte costs \$2.95

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$\begin{aligned}x &= 2.95 \\y &= 1.85\end{aligned}$$

$$\begin{array}{r} -3(4x + 2y = 15.50) \\ 4(3x + 5y = 18.10) \\ \hline -12x - 6y = -46.5 \\ 12x + 20y = 72.4 \\ \hline 14y = 25.9 \\ \frac{14}{14} \quad \frac{25.9}{14} \\ \hline y = 1.85 \end{array}$$

$$\begin{array}{r} 4x + 3.7 = 15.50 \\ -3.7 \quad -3.7 \\ \hline 4x = 11.8 \\ \frac{4}{4} \quad \frac{11.8}{4} \\ \hline x = 2.95 \end{array}$$

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

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

$$\begin{aligned} 4y + 2x &= 15.50 \\ 3y + 5x &= 18.10 \end{aligned}$$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25.

Is Courtney correct? Justify your answer.

$$\begin{aligned} (4 \cdot 2.75) + (2 \cdot 2.25) &= 15.50 \\ 11 + 4.5 &= 15.50 \checkmark \end{aligned}$$

$$\begin{aligned} (3 \cdot 2.75) + (2.25 \cdot 5) &= 18.10 \\ 8.25 + 11.25 &= 18.10 \times \end{aligned}$$

She is not correct because if you do $3y + 5x =$ you don't get 18.10 you get 19.5.

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$\begin{aligned} 3 \cdot 4y + 2x &= 15.50 \\ -4 \cdot 3y + 5x &= 18.10 \\ \hline 12y + 6x &= 46.5 \\ -12y - 20x &= -72.4 \\ \hline -20x + 6x &= 46.5 - 72.4 \\ -14x &= -25.9 \\ \frac{-14x}{-14} &= \frac{-25.9}{-14} \\ x &= 1.85 \end{aligned}$$

$$\begin{aligned} 4y + (2 \cdot 1.85) &= 15.50 \\ 4y + 3.7 &= 15.50 \\ 4y &= 11.8 \\ \frac{4y}{4} &= \frac{11.8}{4} \\ y &= 2.95 \end{aligned}$$

$y = \$2.95$ $x = \$1.85$

Score 5: The student reversed the variables.

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

$$\begin{cases} 4x + 2y = 15.50 \\ 3x + 5y = 18.10 \end{cases}$$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25.

Is Courtney correct? Justify your answer.

Courtney is incorrect.
plugging in her costs to the inequality you get \$19.50 and \$18.10

$$\begin{aligned} 2.75(4) + 2(2.25) &= 15.50 \\ 11 + 4.5 &= 15.50 \\ 3(2.75) + 5(2.25) &= 18.10 \\ 8.25 + 11.25 &= 19.50 \\ 18.10 &\neq 19.50 \end{aligned}$$

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$\begin{array}{r} 3(4x + 2y = 15.50) \\ -4(3x + 5y = 18.10) \\ \hline 12x + 6y = 46.50 \\ -12x - 20y = -72.40 \\ \hline -14y = -26.4 \\ \hline y = 1.89 \end{array}$$

$$\begin{array}{r} 4x + 2(1.89) = 15.50 \\ 4x + 3.78 = 15.50 \\ -3.78 \quad -3.78 \\ \hline 4x = 11.72 \\ \hline x = 2.93 \end{array}$$

$x = 2.93$

latte donut
 $(2.93, 1.89)$

Score 5: The student made one computational error.

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

$$\begin{aligned}15.50 &= 4x + 2y \\ 18.10 &= 3x + 5y\end{aligned}$$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25. Is Courtney correct? Justify your answer.

$$\begin{aligned}15.50 &= 4(2.75) + 2(2.25) = 11 + 4.5 = 15.50 \\ 18.10 &= 3(2.75) + 5(2.25) = 8.25 + 11.25 = 19.50\end{aligned}$$

NO, she is not correct

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$\begin{aligned}15.50 &= 4x + 2y & 18.10 &= 3x + 5y \\ x &= 2.75 & x &= 2.09 \\ y &= 2.25 & y &= 1.85\end{aligned}$$

Score 4: The student wrote a correct system of equations and a correct justification.

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

$$\begin{aligned}4x + 2y &= 15.50 \\3x + 5y &= 18.10\end{aligned}$$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25.

Is Courtney correct? Justify your answer.

Courtney is correct $4(2.75) + 2(2.25)$
because if you plugged $= 15.50$
in the numbers
for x and y in the equation $4x + 2y = 15.50$
with the prices Courtney determined, the equation is true.

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$\begin{aligned}5(4x + 2y &= 15.50) \\2(3x + 5y &= 18.10)\end{aligned}$$

Score 3: The student wrote a correct system of equations, but only substituted into the first equation to indicate a positive response.

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

$$X = \text{cost of one latte}$$

$$Y = \text{cost of one donut}$$

$$\$18.10 = 3x + 5y \quad \$15.50 = 4x + 2y$$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25.

Is Courtney correct? Justify your answer.

Second day	First Day
$2.75 \cdot 3 = 8.25$	$2.75 \cdot 4 = 11$
$2.25 \cdot 5 = 11.25$ (19.5) NO	$2.25 \cdot 2 = 4.5$ = \$15.50 YES

only one is correct

NO. The numbers do not add up correctly.

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$\left(\$15.50 \div 6 \right) = 2.58$$

$$\left(18.10 \div 8 \right) = 2.26$$

$$\begin{aligned} \text{donuts} &= 2.26 \text{ each} \\ \text{latte} &= 2.58 \text{ each} \end{aligned}$$

Score 2: The student justified the middle section correctly.

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

Linear Equation Slope Intercept
 $y = mx + b$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25.

Is Courtney correct? Justify your answer. $11.00 + 4.50 = 15.50$
 $2.75 \cdot 4 = 11.00$
 $2.25 \cdot 2 = 4.5$

Courtney is correct on the amount of money one latte and one donut cost because in her first order it was 15.50 for 4 lattes and 2 donuts and I did the math everything looks good.

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$\begin{array}{r} 2.25 = 2.75x + b \\ -b \qquad \qquad -b \\ \hline 2.25b = 2.75x \\ \frac{2.25}{2.75} \qquad \frac{2.75}{2.75} \\ \hline x = \end{array} \quad \textcircled{?}$$

Score 1: The student only justified by substituting into the first equation to indicate a positive response.

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

$$x + y = \$15.50$$

$$x + y = \$18.10$$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25.
Is Courtney correct? Justify your answer.

one latte = \$2.75
one donut = \$2.25

$$\begin{array}{r} 2.75 \\ + 2.25 \\ \hline 5.00 \\ \times 4 \\ \hline 20.00 \\ + 10.00 \\ \hline 30.00 \end{array}$$

$$\begin{array}{r} 2.25 \\ + 2.25 \\ \hline 4.50 \\ \times 3 \\ \hline 13.50 \end{array}$$

answer:
Courtney is correct because the total is equal to the total she has spent on both days.

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$\begin{aligned} \$15.50 + \$2.75 &= ? \\ \$18.10 + \$2.25 &= ? \end{aligned}$$

$$\begin{aligned} \$15.50 + \$18.10 &= \$33.60 \\ \$2.75 + \$2.25 &= 5.00 \end{aligned}$$

$$\begin{array}{r} 33.60 \\ - 5.00 \\ \hline 28.60 \\ \div 2.25 \\ \hline 12.40 \end{array}$$

one latte = \$2.75
one donut = \$2.25

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

Question 35

35 Courtney went to a coffee shop to purchase lattes and donuts for her friends. One day she spent a total of \$15.50 on four lattes and two donuts. The next day she spent a total of \$18.10 on three lattes and five donuts. All prices included tax.

If x represents the cost of one latte and y represents the cost of one donut, write a system of equations that can be used to model this situation.

$$x^2, y = 15.50x + 18.10$$

Courtney thinks that one latte costs \$2.75 and one donut costs \$2.25.
Is Courtney correct? Justify your answer.

yes because she spends in one day 15.50
on four lattes and two donuts

Use your equations to determine algebraically the exact cost of one latte and the exact cost of one donut.

$$y = 15.50x + 18.10$$

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