Algebra II Semester 1 Practice Exam A

1. To which sets of numbers does –5 belong?

I. integers
II. natural numbers
III. rational numbers
IV. real numbers
V. whole numbers

A. II and IV only
B. III and IV only
C. I, III, and IV only
D. III, IV, and V only

2. Evaluate $b^2 - 4ac$ for $a = -3$, $b = 1$, and $c = -2$.

A. –23
B. –17
C. 17
D. 25

3. Which is a simplified form of the expression $12(x-1) - \frac{2}{3}(6x-18)$?

A. $16x - 24$
B. $8x - 24$
C. $6x + 6$
D. $8x$

4. What is the value of n if $\frac{9}{7}n + \frac{2}{3} = \frac{5}{14}$?

A. $n = -\frac{67}{42}$
B. $n = -\frac{39}{98}$
C. $n = -\frac{13}{54}$
D. $n = \frac{43}{54}$

5. Below is the formula for the surface area of a right circular cylinder.

$$A = 2\pi rh + 2\pi r^2$$

Which is a correct formula for the height, h, expressed in terms of radius, r, and surface area, A?

A. $h = \frac{2\pi r^2 - A}{2\pi r}$
B. $h = \frac{A}{2\pi r^2} - 2\pi r$
C. $h = A - 2\pi r - 2\pi r^2$
D. $h = \frac{A}{2\pi r} - r$

6. Which represents y in terms of x for the equation $3x + 2y = 5x - 6 + y$?

A. $y = -2x + 6$
B. $y = 2x - 6$
C. $y = 8x - 6$
D. $y = 8x + 6$

7. Rewrite the absolute value inequality as a compound inequality: $|x+6|>7$.

A. $-13<x<1$

B. $x>-13$ or $x<1$

C. $x<-13$ or $x>1$

D. no solution

8. Which expresses all of the solutions for the compound inequality below?

$$2(z+4)\geq 2 \text{ and } 15\geq -9+3z$$

A. $-3\leq z\leq 8$

B. $z=-3$ and $z=8$

C. $z\leq -3$ and $z\geq 8$

D. no solution

9. In 2000 the average price of a home in West County was \$95,000. By 2007 the average price of a home was \$123,000. Which of the following is a linear model for the price of a home, *P*, in West County in terms of the year, *t*? Let *t* = 0 correspond to 2000.

A. $P=123{,}000-4{,}000t$

B. $P=95{,}000+4{,}000t$

C. $P=123{,}000-28{,}000t$

D. $P=28{,}000+95{,}000t$

10. Which relation is a function?

A. $x=y^2+4$

B. $3x^2+6y^2-5=1$

C. {(–1, 6), (3, 6), (–5, 6)}

D. {(6, –5), (6, 2), (2, –1)}

11. What is the range of the following relation?

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

A. {–3, –2, 0}

B. {–2, 1, 5}

C. {0, 2, 3}

D. {–5, –1, 2}

12. Write the standard form of the equation of the line that passes through the point $(-2,2)$ and is parallel to the line $5x+2y=-1$.

A. $2x-5y=8$

B. $2x-5y=12$

C. $5x+2y=-6$

D. $5x+2y=-1$

13. Which equation describes the pattern in the table?

x	1	2	3	4	5
y	7	11	15	19	23

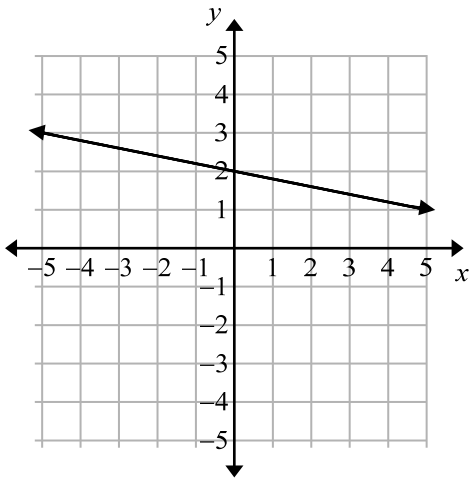
A. $y = 3x - 4$

B. $y = 3x + 4$

C. $y = 4x - 3$

D. $y = 4x + 3$

14. Use the graph below.



What is the slope of the line?

A. $\frac{5}{1}$

B. $\frac{1}{5}$

C. $-\frac{5}{1}$

D. $-\frac{1}{5}$

15. William is hiking in the hills. He began the hike at 10:00 a.m. at an elevation of 2,000 ft. He reached a peak of 4,000 ft. at 2:00 p.m. What is the average rate of change in Bill's elevation?

A. 200 ft. per hour

B. 250 ft. per hour

C. 500 ft. per hour

D. 1000 ft. per hour

16. Write an equation in standard form that is perpendicular to $y = 5x - 2$ and goes through $(-10,3)$.

A. $x + 5y = 5$

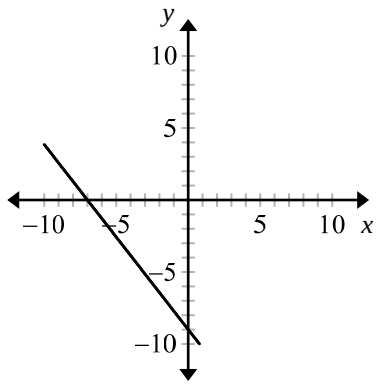
B. $x - 5y = -25$

C. $5x - y = 2$

D. $5x + 5y = -42$

17. Graph the linear equation $9x - 7y = 63$.

A.



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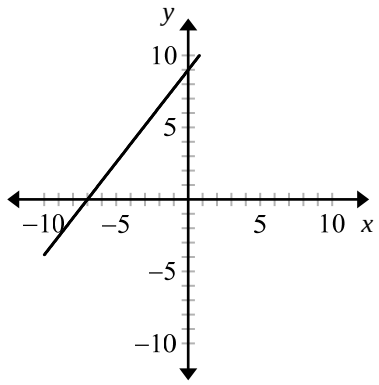

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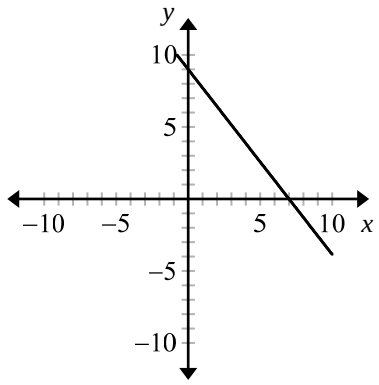

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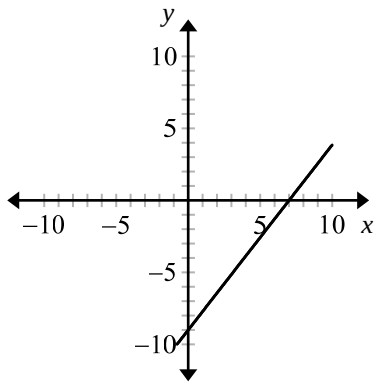


18. Joe's pay (*P*) varies directly with the square of the number of widgets (*w*) he produces. When he produces 2 widgets, he is paid $16. How many widgets would he have to produce to make $144?

A. 6

B. 8

C. 12

D. 36

19. Evaluate $f(-3)$ for the piecewise function:

$$f(x) = \begin{cases} x, & x \le 0 \\ x^2 - 3x, & x > 0 \end{cases}$$

A. $f(-3) = -18$

B. $f(-3) = -3$

C. $f(-3) = 0$

D. $f(-3) = 18$

20. Solve the following linear system.

$$\begin{cases} 5x - 2y = 8 \\ y = \frac{5}{2}x + 3 \end{cases}$$

A. (0, –4)

B. (2, 8)

C. infinitely many solutions

D. no solution

21. Find the *y*-coordinate of the solution to the linear system.

$$\begin{cases} 3x - 4y = -1 \\ x + y = -5 \end{cases}$$

A. –5

B. –3

C. –2

D. no solution

22. What is the *x*-coordinate of the solution to the following system of equations?

$$\begin{cases} 2x + y - z = 5 \\ x + 3z = 14 \\ -2x - 3y + 2z = 2 \end{cases}$$

A. 14

B. 5

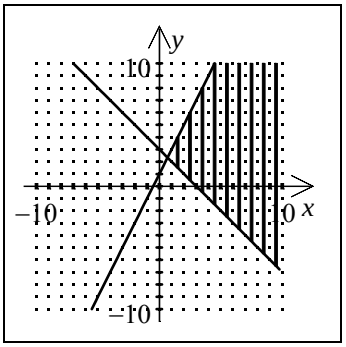
C. –1

D. –2

23. Graph the system of inequalities.

$$\begin{cases} y \le 2x + 1 \\ y \ge -x + 3 \end{cases}$$

A.



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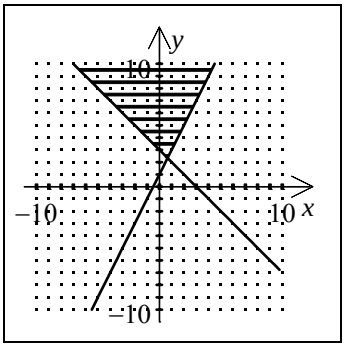

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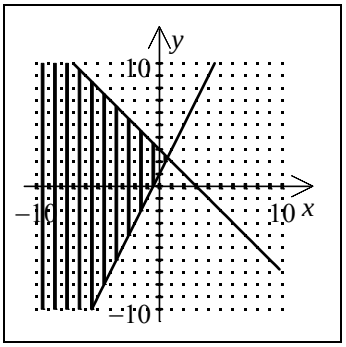

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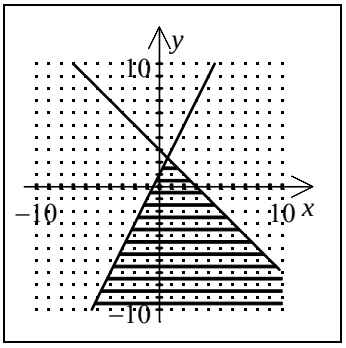


24. For one month of internet access, Southern Nevada Web charges $4.00 per hour with a base fee of $20.00. Silver State Internet does not charge a base fee, but charges $6.00 per hour for internet access. In how many hours of use will the costs for the two companies be the same?

A. 2 hours

B. 10 hours

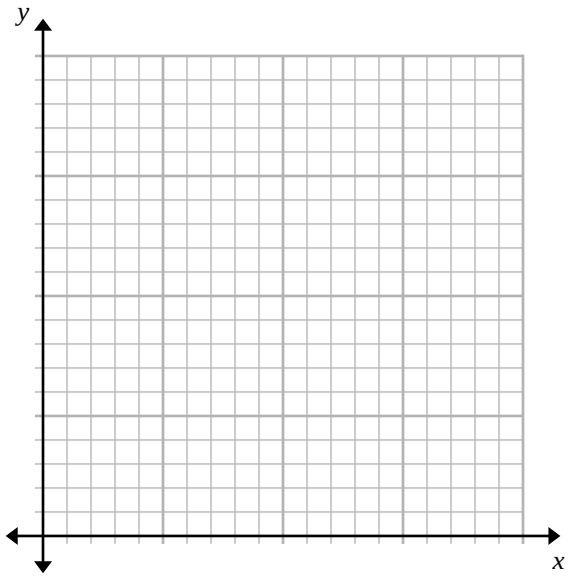
C. 16 hours

D. 24 hours

25. Using linear programming procedures, the equation $C = 4x + 7y$ is to be maximized subject to the following constraints:

$$x \geq 0$$
$$y \geq 0$$
$$x + y \geq 2$$
$$-3x + 4y \leq 8$$
$$2y \geq 5x - 10$$

The grid may be used to sketch the feasible region.



What is the minimum value for the objective function?

A. 51

B. 14

C. 8

D. 0

26. A school fundraiser sells different sizes of gift baskets with a varying assortment of books and pencils. A *basic* basket contains 3 books and 4 pencils. A *big* basket contains 7 books and 8 pencils. Books cost $5, and pencils cost $2.

Which of the following shows the use of matrices to find the total cost for each size of basket?

A. $\begin{bmatrix}3 & 4\\7 & 8\end{bmatrix}\begin{bmatrix}2\\5\end{bmatrix}=\begin{bmatrix}26\\54\end{bmatrix}$

B. $\begin{bmatrix}3 & 4\\7 & 8\end{bmatrix}\begin{bmatrix}5\\2\end{bmatrix}=\begin{bmatrix}23\\51\end{bmatrix}$

C. $\begin{bmatrix}3 & 7\\4 & 8\end{bmatrix}\begin{bmatrix}2\\5\end{bmatrix}=\begin{bmatrix}41\\48\end{bmatrix}$

D. $\begin{bmatrix}3 & 7\\4 & 8\end{bmatrix}\begin{bmatrix}5\\2\end{bmatrix}=\begin{bmatrix}29\\36\end{bmatrix}$

27. Which is the sum $A + B$, given that $A=\begin{bmatrix}-9 & 2 & -3\\1 & 5 & 8\end{bmatrix}$ and $B=\begin{bmatrix}-5 & 4 & 0\\-4 & -3 & -7\end{bmatrix}$?

A. $\begin{bmatrix}-14 & 6 & -3\\-3 & 2 & 1\end{bmatrix}$

B. $\begin{bmatrix}-14 & 6 & -3\\-3 & 2 & -1\end{bmatrix}$

C. $\begin{bmatrix}-4 & 6 & -3\\-3 & -8 & -1\end{bmatrix}$

D. $\begin{bmatrix}14 & 6 & 3\\5 & 8 & 15\end{bmatrix}$

28. Given $A=\begin{bmatrix}0 & 2 & 1\\-5 & -1 & 0\end{bmatrix}$ and $B=\begin{bmatrix}1 & -4\\0 & 1\\5 & -1\end{bmatrix}$, find the product AB.

A. $\begin{bmatrix}0 & -8\\-5 & 1\end{bmatrix}$

B. $\begin{bmatrix}5 & 1\\-5 & 19\end{bmatrix}$

C. $\begin{bmatrix}7 & -3\\-1 & 22\end{bmatrix}$

D. not possible

29. Calculate the determinant:

$$\begin{vmatrix}2 & -3 & 0\\4 & 1 & 3\\0 & 5 & 2\end{vmatrix}$$

A. -50

B. -30

C. -2

D. 0

30. Solve for x and y: $\begin{bmatrix}2 & -5\\-3 & 7\end{bmatrix}\begin{bmatrix}x\\y\end{bmatrix}=\begin{bmatrix}-11\\5\end{bmatrix}$

A. $(-8,1)$

B. $\left(-3,\frac{2}{3}\right)$

C. $\left(\frac{11}{3},\frac{5}{4}\right)$

D. $(52,23)$

31. Which graph from a graphing calculator represents the function $y = -4(x^2 + 8x + 15)$? (Assume the scale on each graph is one unit per tick mark.)

A.

B.

C.

D.

32. Solve the equation $x^2 - 18x + 81 = 0$ by factoring.

A. $x = \pm 9$

B. $x = -9$

C. $x = 9$

D. no solution

33. Which is the solution set for $2x^2 + 7x + 1 = 0$, using the quadratic formula?

A. $\left\{\frac{7+\sqrt{41}}{4}, \frac{7-\sqrt{41}}{4}\right\}$

B. $\left\{\frac{7+\sqrt{57}}{4}, \frac{7-\sqrt{57}}{4}\right\}$

C. $\left\{\frac{-7+\sqrt{57}}{4}, \frac{-7-\sqrt{57}}{4}\right\}$

D. $\left\{\frac{-7+\sqrt{41}}{4}, \frac{-7-\sqrt{41}}{4}\right\}$

34. Which are solutions for $x^2 + 6x - 40 = 0$ when solved by completing the square?

A. $x = 10$ or $x = 4$

B. $x = 10$ or $x = -4$

C. $x = -10$ or $x = 4$

D. $x = -10$ or $x = -4$

35. Which is the solution set of $(6x+4)^2 = 77$?

A. $\left\{\frac{4-\sqrt{77}}{12}, \frac{4+\sqrt{77}}{12}\right\}$

B. $\left\{\frac{4-\sqrt{77}}{6}, \frac{4+\sqrt{77}}{6}\right\}$

C. $\left\{\frac{-4-\sqrt{77}}{12}, \frac{-4+\sqrt{77}}{12}\right\}$

D. $\left\{\frac{-4-\sqrt{77}}{6}, \frac{-4+\sqrt{77}}{6}\right\}$

36. Use the discriminant to determine the number and types of solutions of the equation $9x^2 - 30x + 25 = 0$.

A. no real solutions, 2 imaginary solutions

B. 1 real solution, no imaginary solutions

C. 1 real solution, 1 imaginary solution

D. 2 real solutions

37. What are the solutions of the quadratic equation $3x^2 + 5x = -4$?

A. $x = \frac{-5+i\sqrt{23}}{6}$, $x = \frac{-5-i\sqrt{23}}{6}$

B. $x = \frac{-5+i\sqrt{73}}{6}$, $x = \frac{-5-i\sqrt{73}}{6}$

C. $x = \frac{5+i\sqrt{23}}{6}$, $x = \frac{5-i\sqrt{23}}{6}$

D. $x = \frac{5+i\sqrt{73}}{6}$, $x = \frac{5-i\sqrt{73}}{6}$

38. Write the expression $\frac{7+3i}{3+9i}$ as a complex number in standard form.

A. $\frac{1}{12} - \frac{3}{4}i$

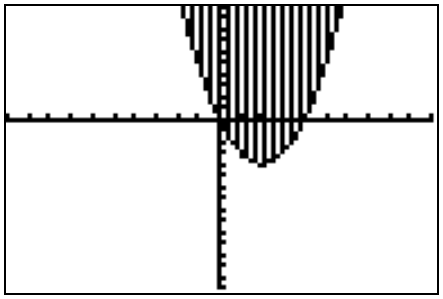
B. $\frac{8}{15} - \frac{3}{5}i$

C. $\frac{8}{15} + \frac{4}{5}i$

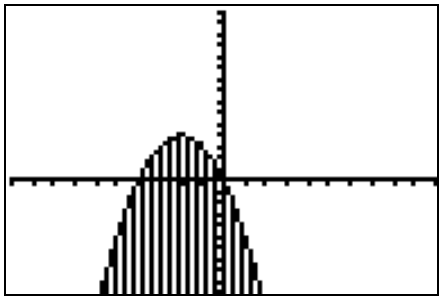
D. $\frac{1}{12} + i$

39. Which of the following screens from a graphing calculator represents $y \leq x^2 - 4x$? (Assume the scale on each graph is one unit per tick mark.)

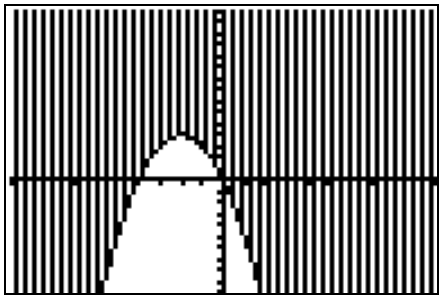
A.



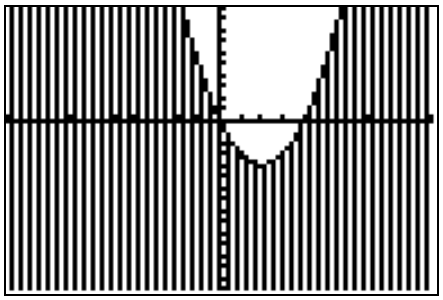
B.



C.



D.



40. For the scenario below, use the model $h = -16t^2 + v_0 t + h_0$, where h = height (in feet), h_0 = initial height (in feet), v_0 = initial velocity (in feet per second), and t = time (in seconds).

A cheerleading squad performs a stunt called a "basket toss" where a team member is thrown into the air and is caught moments later. During one performance, a cheerleader is thrown upward leaving her teammates' hands 6 feet above the ground with an initial vertical velocity of 15 feet per second.

When the girl falls back, the team catches her at a height of 5 feet. How long was the cheerleader in the air?

A. $\frac{1}{16}$ second

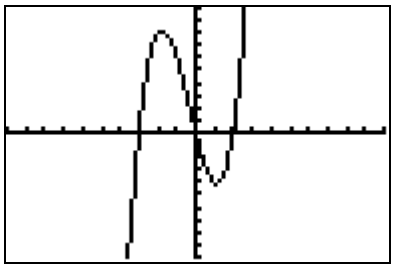
B. 1 second

C. $1\frac{9}{16}$ seconds

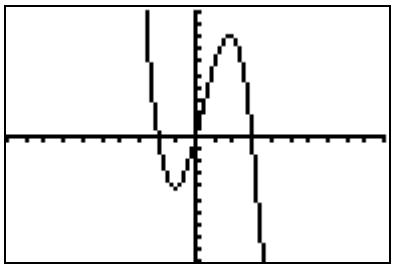
D. 2 seconds

41. Which graph represents the factored function $f(x) = x(x-3)(x+2)$?
(Assume the scale on each graph is one unit per tick mark.)

A.



B.



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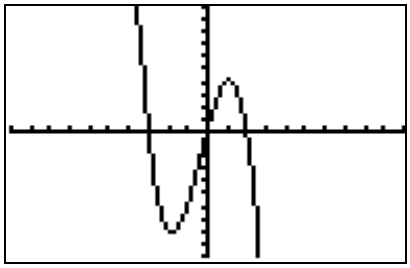

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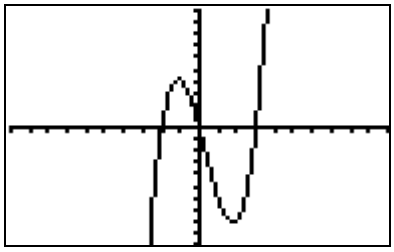
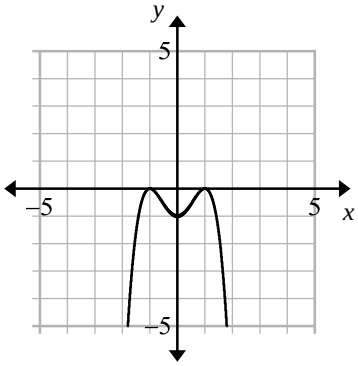
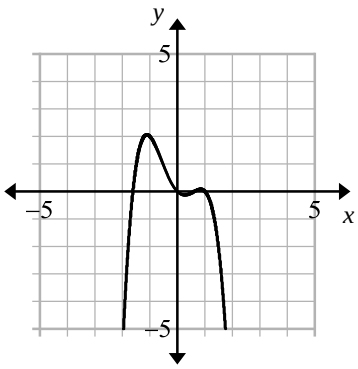


42. Graph the polynomial function:
$f(x) = -x^4 + 2x^2 - 1$

A.



B.



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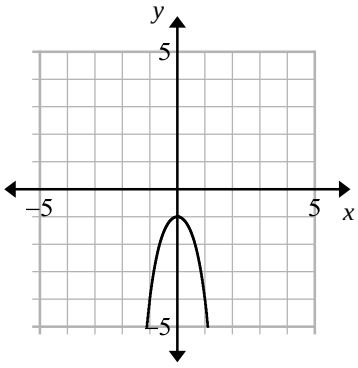
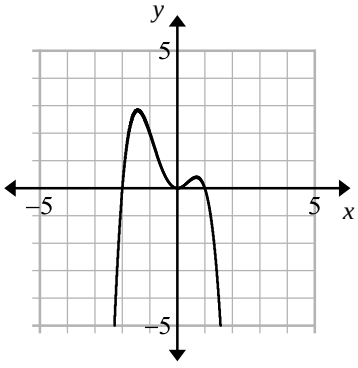


D.



43. Multiply the following polynomials.

$$(x+4)(x^2+x+4)$$

A. x^3+x^2+16

B. $x^3+5x^2+8x+16$

C. $x^3+3x^2+8x+16$

D. x^3+5x^2+16

44. Factor the polynomial x^4-8x^2-9 completely.

A. $(x-1)(x+1)(x^2+9)$

B. $x^2(x^2-8)-9$

C. $(x-3)(x+3)(x^2+1)$

D. $(x+1)^2(x-3)(x+3)$

45. Factor the polynomial expression $8x^3+27$.

A. $(2x+3)^3$

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

C. $(2x+3)(4x^2-6x+9)$

D. $(2x-3)(4x^2+6x+9)$

46. Which of the following represents the solution set of the polynomial equation below?

$$f(x)=4x^3-8x^2-x+2$$

A. $\left\{-\frac{1}{2}, \frac{1}{2}, 2\right\}$

B. $\left\{-1, \frac{1}{2}, 2\right\}$

C. $\{0, 1, 2\}$

D. $\left\{-2, \frac{1}{2}, 2\right\}$

47. According to the *Fundamental Theorem of Algebra*, how many solutions does the polynomial $f(x)=-10+3x+2x^3-4x^5$ have?

A. 2

B. 3

C. 4

D. 5

48. What is x^3-3x^2-6 divided by $x-5$?

A. $x^2+2x+10+\frac{44}{x-5}$

B. $x^2-8x+40-\frac{206}{x-5}$

C. $x^2-8x-\frac{46}{x-5}$

D. $x^2+2x+\frac{4}{x-5}$

49. State the end behavior of the graph of $f(x) = -x^3 + 7x + 4$ as $x \to -\infty$.

A. $f(x) \to -\infty$

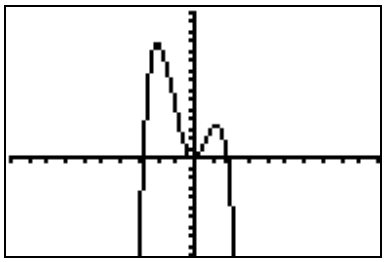
B. $f(x) \to +\infty$

C. $f(x) \to 4$

D. $f(x) \to 0$

50. Which best represents the polynomial function $y = x^4 - x^3 - 5x^2$? (Assume the scale on each graph is one unit per tick mark.)

A.



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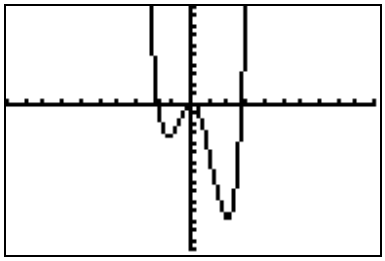
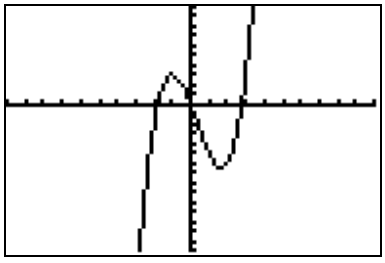


C.



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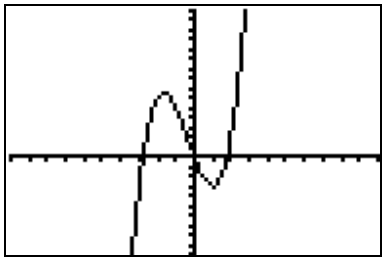

1. Let $p(x) = x(x-3)^2(x+1)$.

A. Sketch the graph of $p(x)$. Label all intercepts.

B. Find another polynomial function, $q(x)$, that has the same zeros as $p(x)$ and goes through the point $(1,-16)$.

C. Explain how to determine the end behaviors of a polynomial function.

2. Let $f(x) = x^2 + 2x - 15$.

A. Find the vertex and the axis of symmetry.

B. $(0, -15)$ is a point on $y = f(x)$. Explain how you can use the symmetric properties of a parabola to find another point on $y = f(x)$.

C. Sketch the graph of $y = f(x)$. Include and label at least 5 points on your graph including the vertex and intercepts.

D. Find the domain and range of $f(x)$.

3. A bakery chain displays prices in a 1×3 matrix and daily sales at its three stores in a 3×3 matrix as shown below:

Prices

Cupcakes	Cookies	Cakes
\$2	\$1	\$10

Number of Items Sold

	Store A	Store B	Store C
Cupcakes	12	10	20
Cookies	25	40	80
Cakes	6	4	12

A. Find the product of the two matrices. Explain what the product represents.

B. How would you find the total gross revenue from all three stores?