Name: _____ **Class:** _____ **Date:** _____ **ID: A**

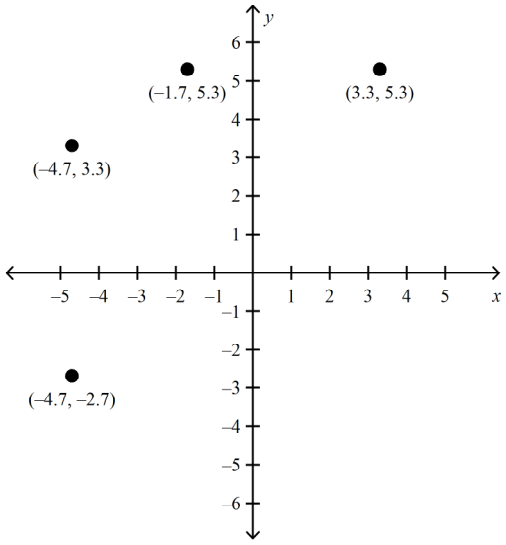
Semester Review

Multiple Choice

Identify the choice that best completes the statement or answers the question.

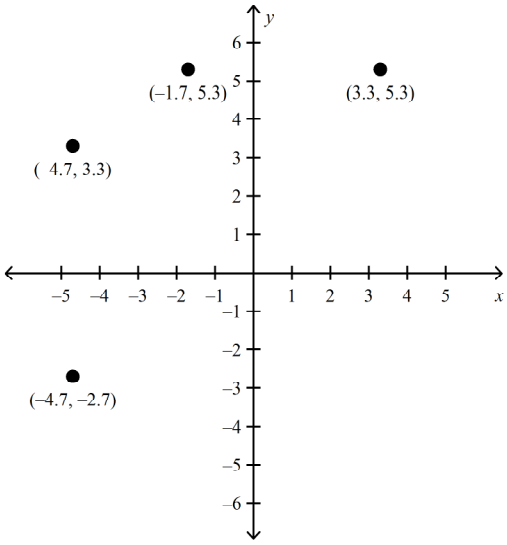
____ 1. Graph the given relation or equation and find the domain and range. Then determine whether the relation or equation is a function.
(3.3, 5.3), (–1.7, 5.3), (–4.7, 3.3), (–4.7, –2.7)

a.



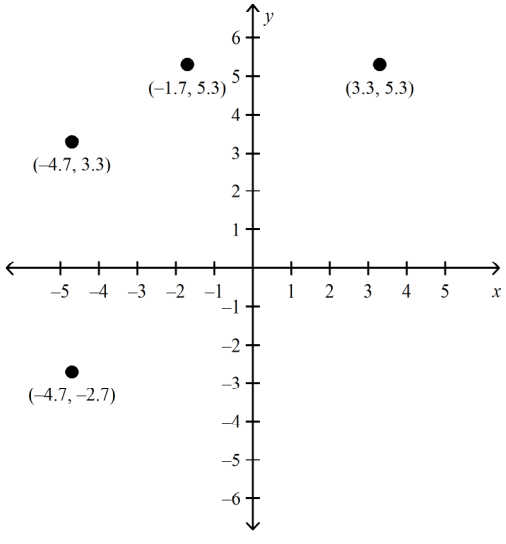
Domain: {–4.7, –1.7, 3.3}
Range: {–2.7, 3.3, 5.3}
The equation is a function.

c.



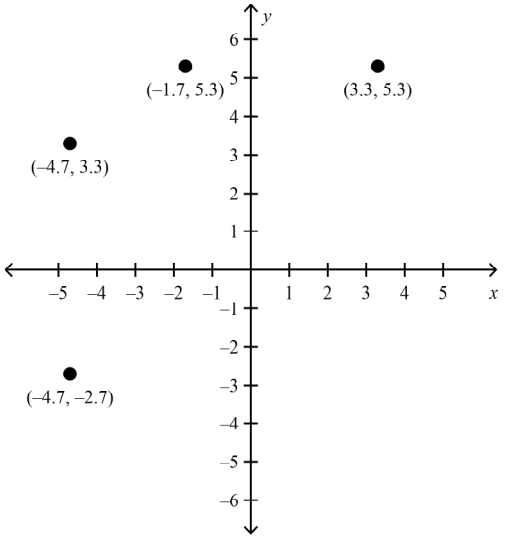
Domain: {–4.7, 5.3, 3.3}
Range: {–2.7, 3.3, –1.7}
The equation is not a function.

b.



Domain: {–2.7, 3.3, 5.3}
Range: {–4.7, –1.7, 3.3}
The equation is a function.

d.



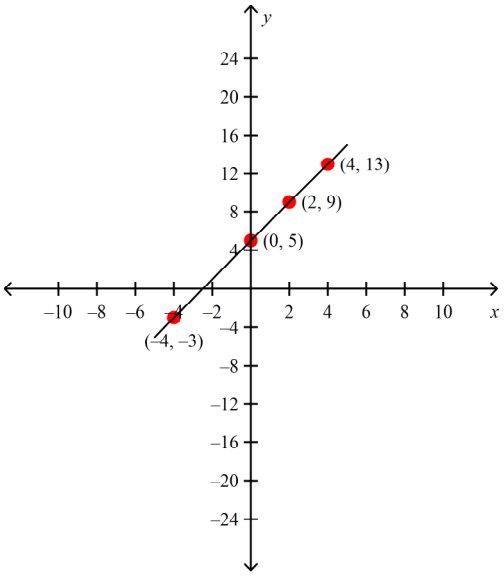
Domain: {–4.7, –1.7, 3.3}
Range: {–2.7, 3.3, 5.3}
The equation is not a function.

Name: _____ **ID: A**

____ 2. Graph the given relation or equation and find the domain and range. Then determine whether the relation or equation is a function.

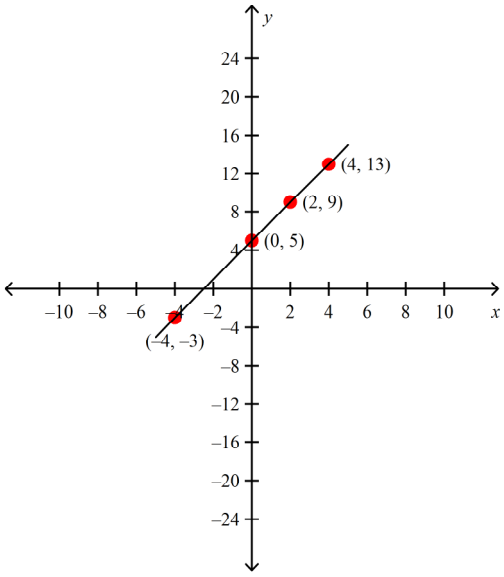
$y = 2x + 5$

a.



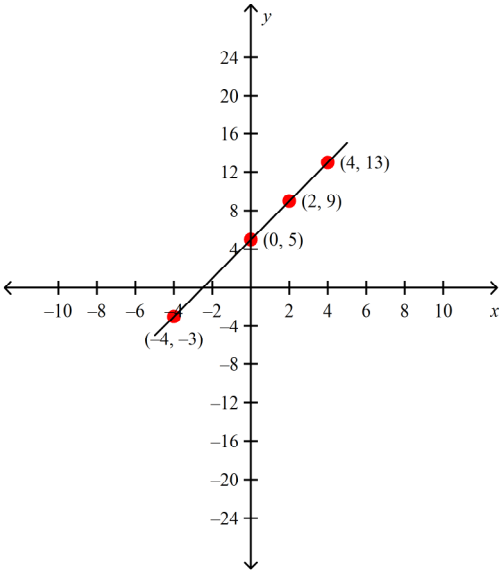
The domain is $\{x \mid x > 5\}$ and the range is all real numbers.
The equation represents a function.

c.



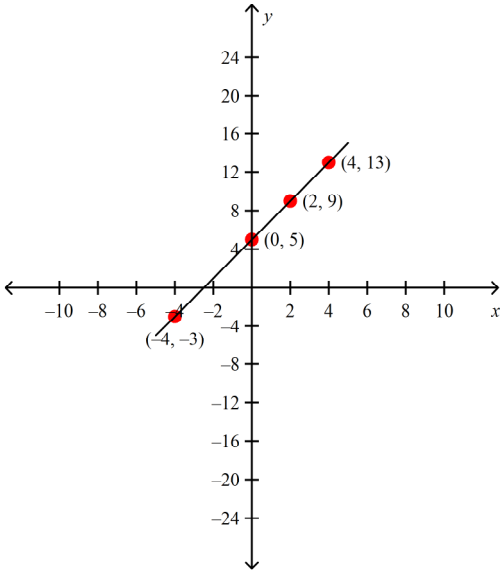
The domain and the range are all real numbers.
The equation is not a function.

b.



The domain and the range are all real numbers.
The equation represents a function.

d.



The domain is $\{x \mid x < 5\}$ and the range is all real numbers.
The equation is not a function.

____ 3. Find the value of $f(-9)$ and $g(4)$ if $f(x) = -4x + 8$ and $g(x) = 6x + 25x^{-2}$.

a. $f(-9) = 44$
$g(4) = 25.56$

b. $f(-9) = -16$
$g(4) = -53.69$

c. $f(-9) = 4$
$g(4) = 49.06$

d. $f(-9) = 28$
$g(4) = 22.44$

____ 4. Find the value of $f(-9)$ and $g(-2)$ if $f(x) = -5x - 2$ and $g(x) = 3x^2 - 21x$.

a. $f(-9) = -7$
$g(-2) = 19$

b. $f(-9) = 47$
$g(-2) = -83$

c. $f(-9) = 43$
$g(-2) = 54$

d. $f(-9) = 10$
$g(-2) = -27$

____ 5. State whether the given equation or function is linear. Write *yes* or *no.* Explain your reasoning.

$7x + \frac{9}{11}y = 7$

a. No, the equation is not linear. It is in the form x + y = c.
b. No, the equation is not linear.
c. Yes, the equation is linear. It is in the form Ax + By = C.
d. Yes, the equation is in linear form. It is in the form xy = C.

____ 6. State whether the given equation or function is linear. Write *yes* or *no.* Explain your reasoning.

$f(x) = 3x + 2$

a. No, the equation is not linear. It is not of the form f(x) = mx + b.
b. No, the equation is not linear. It is in the form x + y = c.
c. Yes, the equation is linear. It is of the form f(x) = m + b
d. Yes, the equation is linear. It is of the form f(x)= mx + b

____ 7. Consider the quadratic function $f(x) = -2x^2 + 2x + 2$. Find the *y*-intercept and the equation of the axis of symmetry.

a. The *y*-intercept is –2.
The equation of the axis of symmetry is $x = -\frac{1}{2}$.

b. The *y*-intercept is $\frac{1}{2}$.
The equation of the axis of symmetry is $x = 2$.

c. The *y*-intercept is + 2.
The equation of the axis of symmetry is $x = \frac{1}{2}$.

d. The *y*-intercept is $-\frac{1}{2}$.
The equation of the axis of symmetry is $x = -2$.

Determine whether the given function has a maximum or a minimum value. Then, find the maximum or minimum value of the function.

____ 8. $f(x) = x^2 - 2x + 2$

a. The function has a maximum value. The maximum value of the function is 1.
b. The function has a maximum value. The maximum value of the function is 5.
c. The function has a minimum value. The minimum value of the function is 1.
d. The function has a minimum value. The minimum value of the function is 5.

____ 9. $f(x) = -x^2 + 2x + 7$

a. The function has a minimum value. The minimum value of the function is 8.
b. The function has a minimum value. The minimum value of the function is 4.
c. The function has a maximum value. The maximum value of the function is 4.
d. The function has a maximum value. The maximum value of the function is 8.

Write a quadratic equation with the given roots. Write the equation in the form $ax^2 + bx + c = 0$, where a, b, and c are integers.

____ 10. –5 and 2

a. $x^2 - 7x + 10 = 0$
b. $x^2 + 7x + 10 = 0$
c. $x^2 - 3x + 10 = 0$
d. $x^2 + 3x - 10 = 0$

____ 11. $-\frac{5}{4}$ and 8

a. $4x^2 - 27x - 40 = 0$
b. $4x^2 + 27x + 40 = 0$
c. $x^2 - 27x - 40 = 0$
d. $x^2 - 27x + 40 = 0$

Solve the equation by factoring.

____ 12. $x^2 + 3x - 28 = 0$

a. $\{-4, 7\}$
b. $\{-7, 4\}$
c. $\{4, 7\}$
d. $\{-4, -7\}$

____ 13. $2x^2 + 3x - 14 = 0$

a. $\{-4, -\frac{7}{2}\}$
b. $\{-\frac{7}{2}, 2\}$
c. $\{-4, 7\}$
d. $\{2, 7\}$

Find the exact solution of the following quadratic equation by using the Quadratic Formula.

____ 14. $x^2 - 8x = 20$

a. $\{-10, 2\}$
b. $\{20, 28\}$
c. $\{-4, 20\}$
d. $\{-2, 10\}$

____ 15. $-x^2 + 3x + 7 = 0$

a. $\left\{\frac{3-\sqrt{37}}{-2}, \frac{3+\sqrt{37}}{-2}\right\}$
b. $\left\{\frac{-3-\sqrt{12}}{-2}, \frac{-3+\sqrt{12}}{-2}\right\}$
c. $\left\{\frac{-3-\sqrt{-19}}{-2}, \frac{-3+\sqrt{-19}}{-2}\right\}$
d. $\left\{\frac{-3-\sqrt{37}}{-2}, \frac{-3+\sqrt{37}}{-2}\right\}$

Find the value of the discriminant. Then describe the number and type of roots for the equation.

____ 16. $-x^2 - 14x + 2 = 0$

a. The discriminant is 196. Because the discriminant is greater than 0 and is a perfect square, the two roots are real and rational.
b. The discriminant is –204. Because the discriminant is less than 0, the two roots are complex.
c. The discriminant is 204. Because the discriminant is greater than 0 and is not a perfect square, the two roots are real and irrational.
d. The discriminant is –188. Because the discriminant is less than 0, the two roots are complex.

____ 17. $x^2 + x + 7 = 0$

a. The discriminant is –29.
Because the discriminant is less than 0, the two roots are complex.
b. The discriminant is 1.
Because the discriminant is greater than 0 and is a perfect square, the two roots are real and rational.
c. The discriminant is –27.
Because the discriminant is less than 0, the two roots are complex.
d. The discriminant is 27.
Because the discriminant is greater than 0 and is a perfect square, the two roots are real and rational.

Write the following quadratic function in vertex form. Then, identify the axis of symmetry.

____ 18. $y = x^2 + 4x - 6$

a. The vertex form of the function is $y = (x+2)^2 - 10$.
The equation of the axis of symmetry is $x = -2$.

b. The vertex form of the function is $y = (x-2)^2 - 10$.
The equation of the axis of symmetry is $x = -2$.

c. The vertex form of the function is $y = (x+2)^2 - 10$.
The equation of the axis of symmetry is $x = -10$.

d. The vertex form of the function is $y = (x+2)^2 + 10$.
The equation of the axis of symmetry is $x = -10$.

____ 19. $y = -3x^2 + 48x$

a. The vertex form of the function is $y = 3(x+8)^2 + 192$.
The equation of the axis of symmetry is $x = -192$.

b. The vertex form of the function is $y = (x+192)^2 + 8$.
The equation of the axis of symmetry is $x = -8$.

c. The vertex form of the function is $y = -3(x-8)^2 + 192$.
The equation of the axis of symmetry is $x = 8$.

d. The vertex form of the function is $y = -3(x+8)^2 + 192$.
The equation of the axis of symmetry is $x = 192$.

Solve the inequality algebraically.

____ 20. $2x^2 + 14x < -12$

a. $\{x \mid -1 < x - 6\}$
b. $\{x \mid -12 < x < -2\}$
c. $\{x \mid -6 < x < -1\}$
d. $\{x \mid -2 < x < -12\}$

____ 21. $x^2 + 4x > 45$

a. $\{x \mid x < 9 \text{ or } x > -5\}$
b. $\{x \mid x < -9 \text{ or } x > 5\}$
c. $\{x \mid x < 9 \text{ or } x > 5\}$
d. $\{x \mid x < -9 \text{ or } x > -5\}$

Simplify the given expression. Assume that no variable equals 0.

____ 22. $\left(19x^{-6}y^{11}\right)\left(-6xy^5\right)$

a. $-114x^{-5}y^{16}$
b. $\dfrac{13y^{16}}{x^5}$
c. $\dfrac{-114y^{16}}{x^5}$
d. $-114x^{-7}y^{-24}$

____ 23. $14x\left(4xy^{14}\right)\left(-4x^{-10}y^{7}\right)$

a. $-224x^{-11}y^{-110}$

b. $\dfrac{-224y^{21}}{x^{9}}$

c. $\dfrac{14y^{21}}{x^{9}}$

d. $-224x^{-9}y^{21}$

____ 24. Find $\left(f+g\right)(x)$ for the following functions.

$f(x) = 6x^2 + 9x + 8$

$g(x) = 4x + 6$

a. $10x^2 + 15x + 8$

b. $10x^3 + 15x + 8$

c. $6x^2 + 13x + 8$

d. $6x^2 + 13x + 14$

____ 25. Find $\left(f+g\right)(x)$ for the following functions.

$f(x) = 22x^2 + 4x + 11$

$g(x) = 3x + 8$

a. $22x^2 + 7x + 19$

b. $25x^2 + 12x + 11$

c. $25x^3 + 12x + 11$

d. $22x^2 + 7x + 11$

____ 26. Find $(f-g)(x)$ for the following functions.

$f(x) = 12x + 15$

$g(x) = -20x^2 + 2x + 30$

a. $-20x^2 - 10x - 15$

b. $32x^2 - 2x - 15$

c. $20x^2 + 10x - 15$

d. $-20x^2 - 10x + 15$

____ 27. Find $(f-g)(x)$ for the following functions.

$f(x) = -3x^3 + 12x^2 - 7$

$g(x) = 11x^2 + 17$

a. $3x^3 - 1x^2 + 10$

b. $-3x^3 + 1x^2 - 24$

c. $-3x^3 + 1x^2 + 24$

d. $-14x^3 + 12x^2 - 24$

____ 28. Find $\left(f\cdot g\right)(x)$ for the following functions.

$f(x) = 3x^2 - 4x - 5$

$g(x) = 11x - 3$

a. $33x^3 - 53x^2 - 43x - 15$

b. $33x^3 + 9x^2 - 87x + 15$

c. $33x^3 - 53x^2 + 12x - 70$

d. $33x^3 - 53x^2 - 43x + 15$

____ 29. Find $\left(f \cdot g\right)(x)$ for the following functions.

$f(x) = x^2 - 9x - 11$

$g(x) = 11x - 4$

a. $11x^3 - 103x^2 + 36x - 165$

b. $11x^3 + 4x^2 - 184x + 44$

c. $11x^3 - 103x^2 - 85x - 44$

d. $11x^3 - 103x^2 - 85x + 44$

____ 30. Find $\left(\frac{f}{g}\right)(x)$ for the following functions.

$f(x) = 20x^3 - 4x^2 + 10x - 13$

$g(x) = -12x^2 - 7$

a. $\frac{20x^3 - 4x^2 + 10x - 13}{-12x^2 - 7}, x \neq \frac{7}{12}$

b. $\frac{20x^3 - 4x^2 + 10x - 13}{-12x^2 - 7}, x^2 = \frac{7}{12}$

c. $\frac{20x^3 - 4x^2 + 10x - 13}{-12x^2 - 7}, x \neq -\frac{7}{12}$

d. $\frac{20x^3 - 4x^2 + 10x - 13}{-12x^2 - 7}, x^2 \neq -\frac{7}{12}$

____ 31. Find $\left(\frac{f}{g}\right)(x)$ for the following functions.

$f(x) = 12x^2 - 5x - 8$

$g(x) = 7x - 6$

a. $\frac{12x^2 - 5x - 8}{7x - 6}, x \neq -\frac{7}{6}$

b. $\frac{12x^2 - 5x - 8}{7x - 6}, x \neq -\frac{6}{7}$

c. $\frac{12x^2 - 5x - 8}{7x - 6}, x \neq \frac{6}{7}$

d. $\frac{12x^2 - 5x - 8}{7x - 6}, x \neq \frac{7}{6}$

____ 32. Find $\left[g \circ h\right](x)$ and $[h \circ g](x)$.

$g(x) = 7x$

$h(x) = -5x^3 + 9x^2 - 2x + 2$

a. $[g \circ h](x) = -35x^4 + 63x^3 - 14x^2 + 14x$
$[h \circ g](x) = -1715x^4 + 441x^3 - 14x^2 + 2x$

b. $[g \circ h](x) = -35x^3 + 63x^2 - 14x + 14$
$[h \circ g](x) = -1715x^3 + 441x^2 - 14x + 2$

c. $[g \circ h](x) = 35x^3 + 63x^2 - 14x + 14$
$[h \circ g](x) = -1715x^3 + 441x^2 - 14x + 2$

d. $[g \circ h](x) = -35x^3 + 63x^2 - 14x + 14$
$[h \circ g](x) = -1715x^3 + 441x^2 - 14x + 14$

____ 33. Find $\left[g \circ h\right](x)$ and $[h \circ g](x)$.

$g(x) = 3x$

$h(x) = -6x - 5$

a. $[g \circ h](x) = -18x^2 - 15x$
$[h \circ g](x) = -18x^2 - 5x$

b. $[g \circ h](x) = -18x - 15$
$[h \circ g](x) = -18x - 5$

c. $[g \circ h](x) = -18x + 15$
$[h \circ g](x) = -18x + 5$

d. $[g \circ h](x) = -18x - 15$
$[h \circ g](x) = -18x - 15$

Find the inverse of the given relation.

____ 34. $\{(1, -5), (12, -7), (9, -9), (16, -13)\}$

a. $\{(-5, 1), (7, -12), (-9, 9), (-13, 16)\}$

b. $\{(-5, 1), (-7, 12), (-9, -9), (-13, 16)\}$

c. $\{(-5, 1), (-7, 12), (-9, 9), (-13, 16)\}$

d. $\{(-5, 1), (-7, 12), (-9, 9), (-13, -16)\}$

____ 35. $\{(1, -3), (-4, 5), (4, -2)\}$

a. $\{(3, -1), (5, -4), (-2, 4)\}$

b. $\{(-3, 1), (-5, 4), (-2, 4)\}$

c. $\{(-3, 1), (5, -4), (2, -4)\}$

d. $\{(-3, 1), (5, -4), (-2, 4)\}$

Write the given expression in radical form.

____ 36. $\left(x^{17}\right)^{\frac{9}{7}}$

a. $\sqrt[9]{x^7}$

b. $\sqrt[7]{x^{17}}$

c. $\sqrt[7]{x^{153}}$

d. $\sqrt[7]{x^9}$

____ 37. $\left(4^{13}\right)^{\frac{9}{7}}$

a. $\sqrt[7]{4^{117}}$

b. $\sqrt[9]{4^7}$

c. $\sqrt[7]{4^{13}}$

d. $\sqrt[7]{4^9}$

Write the given radical using rational exponents.

____ 38. $\sqrt[11]{10x^8y^6}$

a. $10^{\frac{1}{11}}x^8y^6$

b. $10^{\frac{1}{11}}x^{\frac{8}{11}}y^{\frac{6}{11}}$

c. $10^{11}x^{88}y^{66}$

d. $10x^{\frac{8}{11}}y^{\frac{6}{11}}$

____ 39. $\sqrt[2]{6a^5b^9}$

a. $6^2a^{10}b^{18}$

b. $6a^{\frac{5}{2}}b^{\frac{9}{2}}$

c. $6^{\frac{1}{2}}a^5b^9$

d. $6^{\frac{1}{2}}a^{\frac{5}{2}}b^{\frac{9}{2}}$

Write the equation in the standard form for a parabola.

____ 40. $x = 40y^2 - 240y + 120$

a. $x = 40\left(y - 3\right)^2 - 240$

b. $x = 40\left(y - 3\right)^2 + 111$

c. $x = 40\left(y - 3\right)^2$

d. $x = 40\left(y^2 - 6y\right) + 120$

____ 41. $y = 6x^2 - 48x + 100$

a. $y = 6(x - 4)^2 + 4$

b. $y = 6(x - 4)^2 + 68$

c. $y = 6(x - 4)^2$

d. $y = 6(x^2 - 8x) + 100$

Short Answer

Graph the quadratic inequality.

42. $y > x^2 - 3x + 5$

43. $y < 2x^2 - 6x + 10$

Solve the equation by graphing. If exact roots cannot be found, state the consecutive integers between which the roots are located.

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

45. $-x^2 + 4x = 0$