Name: ____

TAC MidTerm Review 2018-2019

Chapter 3

Define the following terms (provide examples as needed):

Quadratic equation in one variable:

Root of an equation:

Zero of a function:

Properties of square roots:

Factoring:

Rationalizing the denominator:

Imaginary unit i:

Complex number:

Imaginary number:

Pure imaginary number:

Completing the square:

Perfect square trinomial:

Vertex form:

Quadratic Formula:

Discriminant:

System of nonlinear equations:

System of linear equations:

Circle:

Quadratic inequality in two variables:

Quadratic inequality in one variable:

Linear inequality in two variables:

Solve the equation using any method.

1. $x^2 + 12x + 35 = 0$

2. $3x^2 - 48 = 0$

3. $x^2 + 10x + 25 = 64$

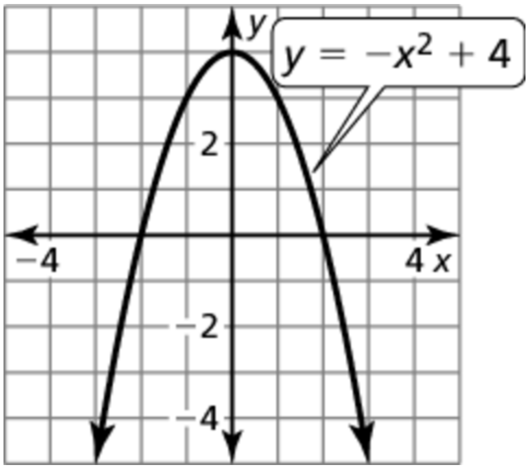
4. $-3x^2 - 5x = 5$

5. $4x^2 + 3x - 10 = 0$

6. $36x^2 + 49 = 0$

Use the graph to determine the number and type of solutions of the quadratic equation.

7.



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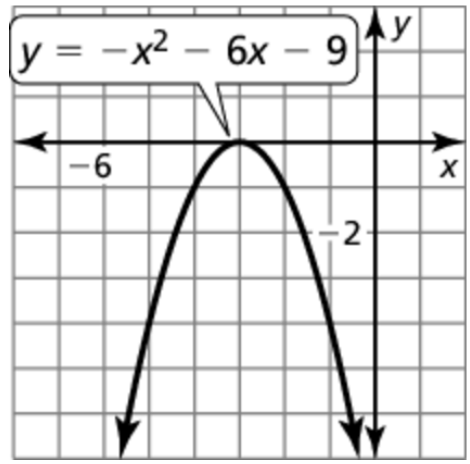

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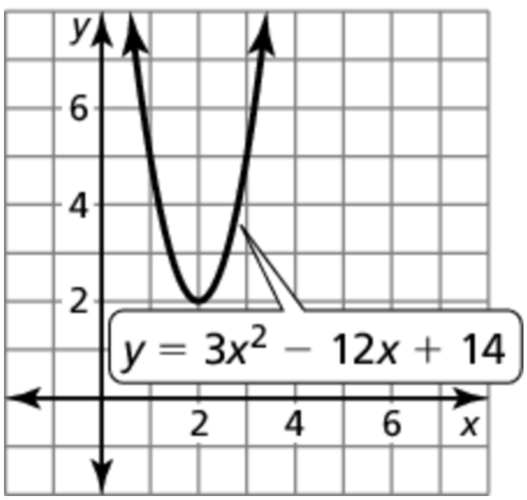

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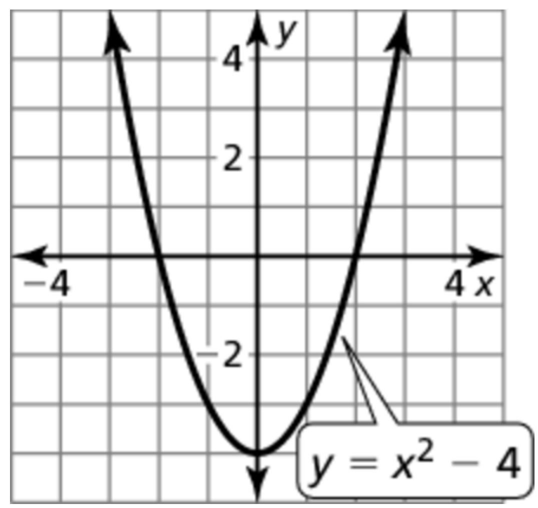


11. A golf ball is hit from the ground, and its height can be modeled by the equation $h(t) = -16t^2 + 128t$, where $h(t)$ represents the height (in feet) of the ball t seconds after contact. What will the maximum height of the ball be?

12. Write $(1 - i) - (4 - 5i)$ as a complex number in standard form.

13. Write $(-4 + 5i)(5 - i)$ as a complex number in standard form.

Solve the system of equations.

14. $-2x^2 + y = 1$

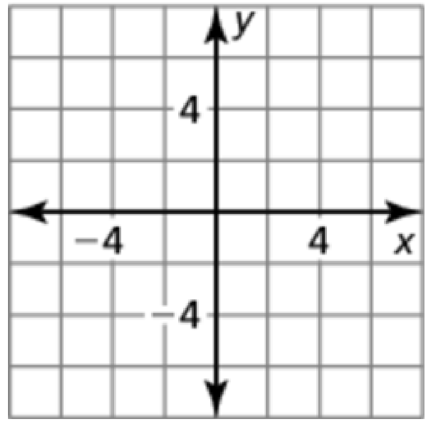
$y = (x - 1)^2 + 3$

15. $4x - y = 4$

$x^2 - y = -1$

Graph the inequality.

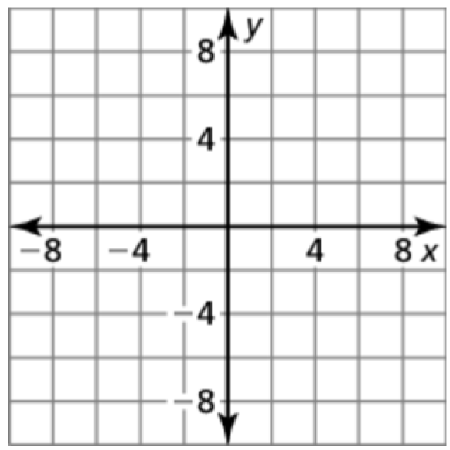
16. $3x^2 - y > 5$



Graph the system of quadratic inequalities.

17. $x + y^2 > 3$

$-3x + y < 1$



18. A company that produces video games has hired you to set the sale price for its newest game. Based on production costs and consumer demand, the company has concluded that the equation $p(x) = -0.3x^2 + 45x - 1000$ represents the profit p (in dollars) for x individual games sold. What will the company's profit be if it sells 100 games?

19. To begin a basketball game, a referee must toss the ball vertically into the air. This process can be modeled by the equation $h(t) = -16t^2 + 22t + 6$, where h represents the ball's height (in feet) after t seconds. Determine the time interval (in seconds) in which the height of the basketball is greater than 8 feet. Round your answer to the nearest thousandth of a second.

Chapter 4

Define each of the following terms and provide an example if needed:

Polynomial:

Polynomial function:

End behavior:

Monomial

Linear function:

Quadratic function:

Like terms:

Identity:

Polynomial long division:

Synthetic division:

Divisor:

Quotient:

Remainder:

Dividend:

Factored completely:

Factor by grouping:

Quadratic form:

Zero of a function:

Repeated solution:

Roots of an equation:

Real numbers:

Conjugates:

Find the product or quotient.

1. $(2x - 2)^2$

2. $(c^8 - 6)(c^2 - 4c - 2)$

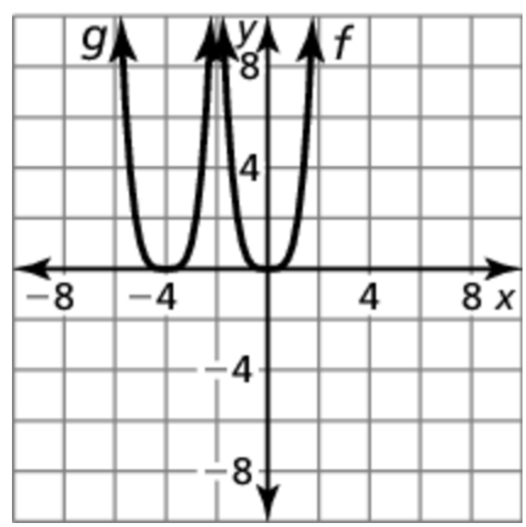
3. $\left(4x^3 + 20x^2 + 12x - 16\right) \div (x - 4)$

4. $(b + 3)(b + 3)(b + 2)$

5. $\left(3x^4 - 2x^3 + 5x - 3\right) \div \left(x^2 - 3x + 1\right)$

6. $(3x + 1)^3$

7. The graphs of $f(x) = x^4$ and $g(x) = (x + 4)^4$ are shown.



a. How many zeros does each function have? Explain.

b. Describe the transformation of *f* represented by *g*.

c. Determine the intervals for which the function *g* is increasing or decreasing.

8. The volume V (in cubic feet) of a hot tub is modeled by the polynomial function $V(x) = x^3 - 10x^2 + 11x + 70,$ where x is the length of the hot tub.

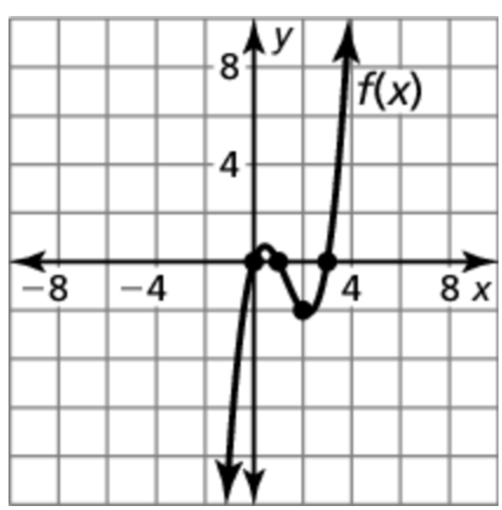
a. Explain how you know $x = -5$ is *not* a possible rational zero.

b. Show that $x + 2$ is a factor of $V(x)$. Then factor $V(x)$ completely.

9. Your student council decided to start a pencil sale. The table below shows the profits p (in dollars) of the sale during the first 5 months. Use a graphing calculator and finite differences to find a polynomial model for the problem. Then use the model to predict the profit after 12 months.

Month, *t*	1	2	3	4	5
Profit (dollars), *p*	1	4	23	70	157

10. The graph of a cubic function $f(x)$ is shown. Describe the degree and the leading coefficient of f.



11. Let G be the number (in billions) of new green tea sales. Let J be the number (in billions) of new fruit juice sales. During a 20-year period, G and J can be modeled by the following equation, where t is the time (in years).

$$G = 6t^4 + 3t^3 - 2t^2 + 5t + 60$$

$$J = 3t^4 - 3t^3 + 5t^2 - 5t + 45$$

a. Find a new model A for the total number of new green tea and fruit juice sales.

b. Is the new function A *even*, *odd*, or *neither*? Explain your reasoning.

Chapter 5

nth root of a:

Index of a radical:

Square root:

Cube root:

Exponent:

Simplest form of a radical:

Conjugate:

Like radicals:

Properties of integer exponents:

Rationalizing the denominator:

Absolute value:

Radical equation:

Rational exponents:

Radical expressions:

Solving quadratic equations:

Domain:

Simplify the expression.

1. $(-32)^{3/5}$

2. $2\sqrt{72} - 3\sqrt{2}$

3. $\dfrac{\sqrt[5]{1215}}{\sqrt[5]{5}}$

4. $\sqrt[3]{-8x^3y^5z^7}$

5. $27^{2/3}$

6. $\dfrac{2}{1-\sqrt{2}}$

7. At the circus, the length of time t (in seconds) it takes for a trapeze artist to complete one full walk is given by the equation $t = 2.31\ell^{1/2}$, where ℓ is the length (in feet) of the trapeze line. The table below shows the length of the lines a certain performer must walk each show. How long will each walk take? Round your answers to the nearest tenth.

Act	**Walk length**	**Time**
Act 1	60 feet	
Act 2	40 feet	
Act 3	100 feet	
Act 4	300 feet	

8. Let $f(x) = -2x^{2/5}$ and $g(x) = -x^{2/5}$. Find $(f + g)(x)$ and $(f - g)(x)$ and state the domain of each. Then evaluate $(f + g)(243)$ and $(f - g)(243)$.

9. Let $f(x) = \frac{2}{3}x^{3/2}$ and $g(x) = -4x$. Find $(f \bullet g)(x)$ and $\left(\frac{f}{g}\right)(x)$ and state the domain of each.

Then evaluate $(f \bullet g)(4)$ and $\left(\frac{f}{g}\right)(4)$.

10. The equation $d = (1.35h)^{1/2}$ represents the distance d (in miles) you can see out into the horizon, where h is the height (in feet) of your eyes above ground level. Determine how tall a person is if he or she can see 2.75 miles out into the horizon. Round your answer to the nearest hundredth.