Key (1)

Fall Final Exam Review 2013 Review Three

1. Name the parent graph and describe the transformations:

a. $f(x)=\frac{1}{x+1}-2$ Down 2 RATIONAL Left one

b. $f(x)=-3^{x-2}$ EXPONENTIAL Right 2

c. $h(x)=-2(x-1)^3+4$ Flip up Right 1 CUBIC

2. Let $g(x)$ be the transformation of down 3 and left 5 of $f(x)=|x|$.

Write the rule for $g(x)$. $|x+5|-3$

3. Reflect the graph of $f(x)=\sqrt{x}$ across the x-axis, and vertically dilate by a factor of 2.

$-2\sqrt{x}$

4. Use the description to write the quadratic function in vertex form. The parent function $f(x)=x^2$ is vertically compressed by a factor of $\frac{3}{5}$ and then translated 2 units right and 1 unit down to create $g(x)=$ $\frac{3}{5}(x-2)^2-1$.

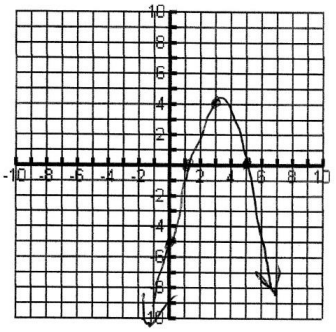
5. Given the function: $f(x)=-x^2+6x+1$. $h=\frac{-b}{2a}$

Does it open up or (down?) Axis of symmetry $x=3$ Vertex $(3,10)$ Y-intercept 1

6. Find the following for the function: $f(x)=x^2+5x-6$

Is the vertex a Max or (Min?) What is its value? -12.25

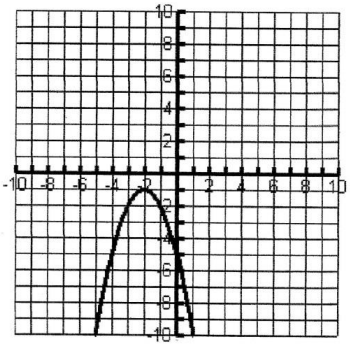
Domain all Reals Range $y \geq$



7. Graph the function. Identify the vertex and four additional points. Identify the equation of the axis of symmetry. $f(x)=-x^2+6x-5$

8. Write the equation for the graph shown.

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



Key (2)

Find the zeros of each function by any method.

9. $f(x) = x^2 - 3x$ $x(x-3)$ (0, 3)

10. $f(x) = x^2 - 9x - 2$ $a=1\ b=-9\ c=-2$ $x = \frac{9}{2} \pm \frac{\sqrt{89}}{2}$

Find the roots of each equation using factoring.

11. a) $5x^2 - 9x - 2 = 0$ $(x-2)(5x+1)$ $x=2$ $x=-\frac{1}{5}$

b) $4x^2 = 49$ $(2x-7)(2x+7)$ $x = \pm\frac{7}{2}$

12. a) $17x = 2x^2 + 8$ $(x-8)(2x-1)$ $x=8$ $x=\frac{1}{2}$

b) $3x^2 - 27x = 0$ $3x(x-9)$ $x=0$ $x=9$

13. Write a quadratic function in standard form with zeros 2 and –5.

$x=2 \quad x=-5 \quad (x-2)(x+5) = x^2+3x-10$

14. A rocket is launched from ground level with an initial velocity of 480 ft/s. After how many seconds will the rocket hit the ground? Use $h(t) = -16t^2 + v_o t + h_o$. $v_o = 480$

$h_o = 0 \quad -16t^2 + 480t + 0$ 30 seconds

Solve each equation by using the quadratic formula.

15. $x^2 + 7x + 10 = -2$ $a=1\ b=7\ c=12$ $x=-4$ $x=-3$

16. $5x^2 - 10x = 40$ $a=5\ b=-10\ c=-40$ $x=-2$ $x=4$

Write each function in vertex form and identify its vertex , axis of symmetry, and the y-intercept.

17. $f(x) = 2x^2 + 8x - 5$

Vertex = $(-2, -13)$
Axis of symmetry = $x=-2$
y-intercept = -5

18. $f(x) = x^2 - 2x - 15$

Vertex = $(1, -16)$
Axis of symmetry = $x=1$
y-intercept = -15

19. Rewrite in standard form. Identify the leading coefficient, degree of the polynomial, and the number of terms.

polynomial	standard form	leading coefficient	degree	number of terms
a). $5x + 4x^3 + 9 - x^2$	$4x^3 - x^2 + 5x + 9$	4	3	4
b). $2x^3 - 8 + 3x^5 + 6x^4 - 11x$	$3x^5 + 6x^4 + 2x^3 - 11x - 8$	3	5	5

20. Add or subtract. Write your answer in standard form.

a). $(3x^5 - 8x^3 + 4x + 5) + (2x^3 + x - 7)$ $3x^5 - 6x^3 + 5x - 2$

b). $(x^2 - 6) - (2x^3 + 5x - 7 + 8x^2)$ $-2x^3 - 7x^2 - 5x + 1$

21. Find each product.

a.) $(3x^2 + x - 6)(x^2 + 2x)$ $3x^4 + 7x^3 - 4x^2 - 12x$

b. $(2x-1)(3x^2 - 5x + 2)$ $6x^3 - 13x^2 + 9x - 2$

c.) $(x-2)^3$ $x^2 - 4x + 4$

Key

(3)

22. Divide by using long division

a.) $(6x^3-19x^2+33x-30)\div(3x-5)$

$2x^2-3x+6$

$3x-5 \overline{)\,6x^3-19x^2+33x-30}$

$-(6x^3-10x^2)$

$-9x^2+33x$

$-(-9x^2+15x)$

$18x-30$

$-(18x-30)$

0

b.) $(y^4+10y^2+21)\div(y^2+3)$

y^2+7

$y^2+3 \overline{)\,y^4+10y^2+21}$

$-(y^4+3y^2)$

$7y^2+21$

23. Divide by using synthetic division.

a.) $(8x^4-6x^2+4x+6)\div(x-2)$

2 | 8 0 −6 4 6

16 32 52 112

8 16 26 56 | 118

$8x^3+16x^2+26x+56+\frac{118}{x-2}$

b.) $(-5x^2+6x-10)\div(x+7)$

−7 | −5 6 −10

35 −287

−5 41 | −297

$-5x+41-\frac{297}{x+7}$

24. Use synthetic substitution to evaluate the polynomial for the given value.

$P(x)=5x^2-8x+3$ for $x=4$

4 | 5 −8 3

20 48

5 12 | 51

P(4) = 51

25. Express $5\sqrt{-72}$ in terms of ***i***.

$30i\sqrt{2}$

26. Find the complex conjugate of each of the following. A) $5-3i$ B) $5i-7$

A) $5+3i$

B) $-7-5i$

Questions 27-29

For each quadratic equation ,

A) find the value of the discriminant b^2-4ac

B) find the type and number of solutions for each equation

C) find the complex solutions

27. $2x^2+3=4x$ A) −8 B) Complex, 2 C) $1\pm\frac{\sqrt{2}}{2}i$

28. $x^2-6x=-9$ A) 0 B) Real, 1 C) 3

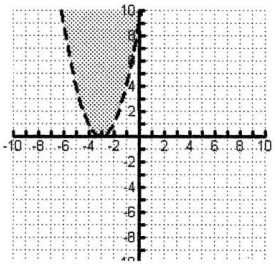
29. $x^2+3x-7=0$ A) 37 B) Real, 2 C) $\frac{-3}{2}\pm\frac{\sqrt{37}}{2}$

30. What is the solution of $x^2-6x-27\geq 0$? $x\leq -3$ or $x\geq 9$

31. What is the solution of $x^2-12x+20<0$?

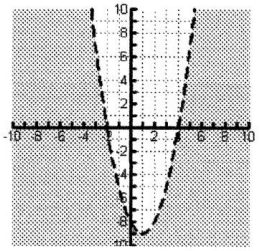
$2<x<10$

32. Write a quadratic inequality for this graph.



$(x+3)^2>0$

33. Write a quadratic inequality for this graph.



$(x-1)^2-7<0$

Key

Perform the indicated operation and write each answer in $a+bi$ form.

34. $(2+6i)+(1-8i)=$ $3-2i$

35. $(5-6i)-(7-2i)=$ $-2-4i$

36. $3i(5-4i)=$ $12+15i$

37. $(4+2i)(1-5i)=$ $14-18i$

38. Adeline hits a volleyball with an initial vertical velocity of 20 ft/s from a height of 4 feet. Write a function h in standard form for the ball's height in feet in terms of the time t in seconds after the ball is hit. Then find the maximum height of the ball **and** the number of seconds (to the nearest hundredth) for the ball to hit the ground.

Function $-16t^2+20t+5=h(t)$ maximum height = 10.25 ft seconds to hit the ground 1.43 seconds

Find the zeros of each function by factoring.

39. a. $f(x)=x^2-6x$
$x(x-6)$ $0, 6$

b. $x^3-x^2-9x+9=0$
$(x-3)(x+3)(x-1)$ $3, -3, 1$

40. a. $f(x)=x^2-8x+12$
$(x-6)(x-2)$ $6, 2$

b. $x^4-11x^2+28=0$
$(x-2)(x+2)(x^2-7)$ $2, -2, \pm\sqrt{7}$

41. a. $f(x)=x^2-2x-35$
$(x-7)(x+5)$ $7, -5$

b. $x^4-6x^3+9x^2=0$
$x^2(x-3)^2$ $0, 3$

42. Suppose a quadratic function contains the point $(5,-8)$ and has an axis of symmetry of $x=6$. Name one other point that would have to be on the graph of the function.
Second point that must be on the graph $(7,-8)$

43. Solve the equation $2x^2+32=0$ $\pm 4i$

44. Explain how to find the y-intercept of any function. Let $x=0$

45. Suppose the leading coefficient of a quadratic function is a positive number and the vertex is at the point $(-4,3)$. What is the range of the function? $y \geq 3$

46. If $y=-3(x+5)^2-9$ were moved up 4 and right 12, what is the equation of the new function?
$y=-3(x-7)^2-5$

47. Which method would be the best choice for solving the system given?

$$\begin{cases} y=x+5 \\ 2x+y=17 \end{cases}$$

Substitution

48. Which method would be the best choice for solving the system given?

$$\begin{cases} x+5y=-10 \\ 2x+3y=15 \end{cases}$$

Elimination

KEY

(5)

49. Solve the system of equations using the method of your choice.

$\begin{cases} 3x+3y=9 \\ -x+3y=5 \end{cases}$

$x=1$
$y=2$

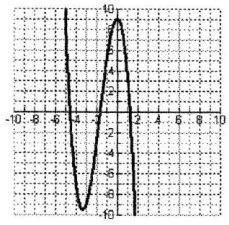
50. Solve the system of equations using the method of your choice.

$\begin{cases} x+3y=10 \\ 3x+9y=30 \end{cases}$

Same Line — All Reals

51. Classify each of the graphs of the polynomial functions below by their degree and leading coefficient. Then determine the end behavior of each graph.

a.



Circle the correct choice.

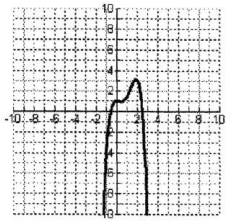
Degree: Even *or* Odd

Leading Coefficient is Positive *or* Negative

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

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

b.



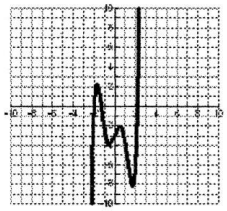
Degree: Even *or* Odd

Leading Coefficient is Positive *or* Negative

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

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

c.



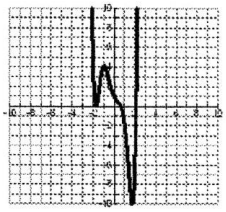
Degree: Even *or* Odd

Leading Coefficient is Positive *or* Negative

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

As $x \to +\infty, f(x) \to$ $+\infty$

d.



Degree: Even *or* Odd

Leading Coefficient is Positive *or* Negative

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

As $x \to +\infty, f(x) \to$ $+\infty$

KEY (6)

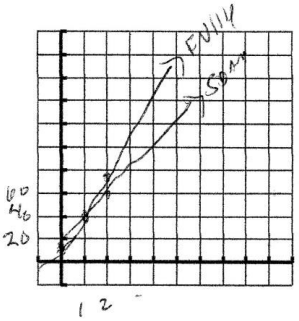
52. Fayetteville Country Club golf course charges \$10 to rent golf clubs plus \$30 per hour for golf cart rental. Springdale Country Club golf course charges \$15 to rent clubs plus \$25 per hour to rent a cart.

a) Write an system of linear equations to find the number of hours for which the rental cost is the same. $COST = 10 + 30h$, $COST = 15 + 25h$

b) Graph the system.

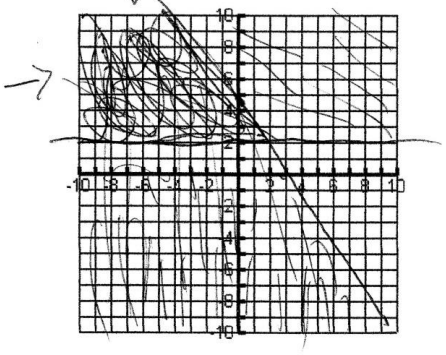
c) For what number of hours is the cost of renting clubs and cart the same for each course? ONE

d) How much would it cost for that number of hours? \$40



53. Graph the system of inequalities:

$$\begin{cases} y \le -\frac{3}{2}x + 5 \\ y \ge 2 \end{cases}$$



54. Use your graphing calculator to estimate the real zeros, local maximum, and local minimum of $f(x) = x^3 - 10x + 1$. Round your answers to the nearest thousandth.

a. real zeros -3.211, 0, 3.111 b. maximum 13.172 c. minimum -11.172

55. Solve by finding all roots by using the calculator to find as many rational roots as possible, then use synthetic division and the quadratic formula to find the remaining roots. Show all work!

$$x^4 - 5x^3 - 2x^2 - 20x - 24 = 0$$

From graph $x = -1$, $x = 6$

-1 | $1\ -5\ -2\ -20\ -24$
$+\ \ -1\ \ 6\ \ -4\ \ 24$
$1\ -6\ \ 4\ -24\ \ 0$

6 | $1\ -6\ \ 4\ -24$
$+\ \ \ \ 6\ \ 0\ \ 24$
$1\ \ 0\ \ 4\ \ 0$

$x^2 + 4 = 0$
$x = \pm\sqrt{-4}$
$x = \pm 2i$

-1, 6, $\pm 2i$