Algebra 2 Honors **Name**_____
Midterm Exam Review **Date**_____**Block**_____

Know your parent functions! Be able to recognize the graph of each of the functions we've studied this semester and be able to identify the domain and range of each function.

Chapter 1

In 1 - 2, let *g*(*x*) be the indicated transformation of *f*(*x*). Write the rule for *g*(*x*).

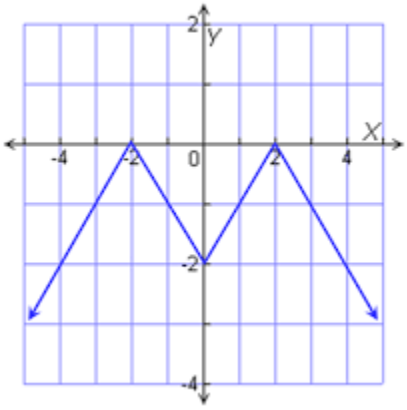
1. $f(x) = -3x + 7$; horizontal compression by a factor of $\frac{3}{4}$ followed by a translation of up 3

2. $f(x) = -3x + 7$; vertical compression by a factor of $\frac{3}{4}$ followed by a reflection in the *y*-axis

In 3 - 4, use a table to perform each transformation of *y* = *f*(*x*) and graph each new function on the same coordinate plane.

3. horizontal stretch by a factor of 3

4. reflection across the *x*-axis, vertical stretch by a factor of 3 and horizontal translation 1 unit left



In 5 - 7, identify the parent function for *g* from its function rule. Then describe what transformations of the parent function it represents.

5. $g(x) = \sqrt{-2(x-5)}$

6. $g(x) = 4x^2 - 2$

7. $g(x) = -x - \sqrt{2}$

Chapter 2

In 8 - 11, use the description to write a quadratic function in the specified form.

8. Write a quadratic function in vertex form that has its vertex at (-3, 2) and passes through the point (4, -1).

9. The parent function $f(x) = x^2$ is reflected across the x-axis and translated 6 units down to create g. Write g in vertex form.

10. Write a quadratic function in standard form that fits the points (-1, 8), (0, 4), and (2, 2).

11. Write a quadratic in vertex form with x-intercepts of -1 and 3 and a leading coefficient of 2.

In 12 - 17, simplify completely. When necessary, write the result in the form *a* + *bi*.

12. $\left(4\sqrt{-3}\right)^2$

13. $(-1 + 2i) + (6 - 9i)$

14. $(4 + 5i)(2 + i)$

15. $\dfrac{5+i}{2-i}$

16. $i^{24} + i^{13} - i^{12}$

17. $\dfrac{3+i\sqrt{2}}{4+i\sqrt{2}}$

In 18 - 19, identify the vertex, axis of symmetry, *y*-intercept, *x*-intercept(s), direction of opening, domain and range for each function. Then, graph each function.

18. $f(x) = (x + 5)^2$

19. $p(x) = \dfrac{1}{4}x^2 + x + 2$

In 20 - 23, find the zeros or roots of each function or equation using any of the following methods.

F: Factoring **S: Solving by Square Roots**
CTS: Completing the Square **QF: Quadratic Formula**

Each method must be used once. Indicate which method you used in the blank provided. Remember to show work to support your answer.

20. $f(x) = 3x^2 - 17x + 10$ _____ **Method used**

21. $30x - 45 = 5x^2$ _____ **Method used**

22. $3x^2 + 42 = 0$ _____ **Method used**

23. $3x^2 + 27x = 53$ _____ **Method used**

24. Solve algebraically: $x^2 - 14x + 45 \leq -3$

25. Without solving, determine the number and type of solutions for $x^2 - 4x = 8$.

26. While playing catch with his grandson yesterday, Tim threw a ball as hard as possible into the air. The height h in feet of the ball is given by $h(t) = -16t^2 + 64t + 8$ where t is in seconds.

Find the following:

(a) the maximum height of the ball

(b) the time it took to achieve this height

(c) the time it took for the ball to reach the grandson's glove if he caught it at a height of 3 feet. (Round answer to the nearest hundredth.)

27. A bicyclist is riding at a speed of 20mi/h when she starts down a long hill. The distance d she travels in feet can be modeled by the function $d(t) = 5t^2 + 20t$, where t is the time in seconds.
(a) The hill is 585 ft long. To the nearest second, how long will it take her to reach the bottom?

(b) Suppose the hill were only half as long. To the nearest second, how long will it take her to reach the bottom?

Chapter 3

In 28 - 31, factor completely:

28. $8y^3 - 4y^2 - 50y + 25$

29. $24n^2 + 3n^5$

30. $2x^4 - 2x^3 - 8x^2 + 8x$

31. $s^6 - 1$

In 32 - 33, find all the zeros of each function.

32. $g(x) = x^3 - x^2 - x + 1$

33. $h(x) = x^4 - 4x^3 - 9x^2 + 16x + 20$

34. Solve $x^4 - 9x^3 + 39x^2 - 225x + 350 = 0$ if $5i$ is a root

35. List the possible rational zeros of $h(x) = -3x^4 - 5x^3 - 3x^2 + 7x + 8$ using the rational root theorem.

36. Identify the leading coefficient, degree and end behavior of $r(x) = -6x^4 + 4x^3 - x^2 + 1$

In 37 – 39, write the simplest polynomial function with the given roots.

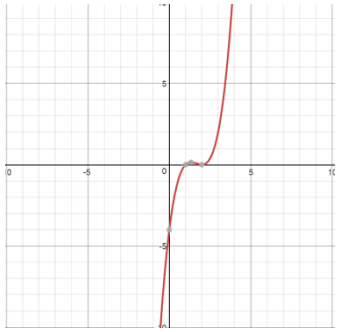
37. $-\frac{1}{2}, -2, 3$

38. $-3, i$

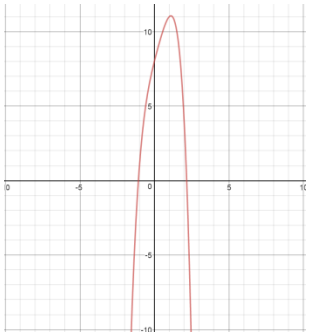
39. $1 + \sqrt{3}, 2i$

In 40 – 41, determine whether the function graphed has an odd or even degree and a positive or negative leading coefficient. Then, describe the end behavior.

40.

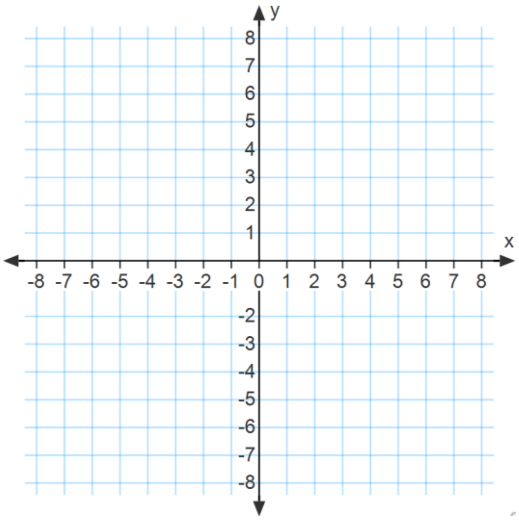


41.

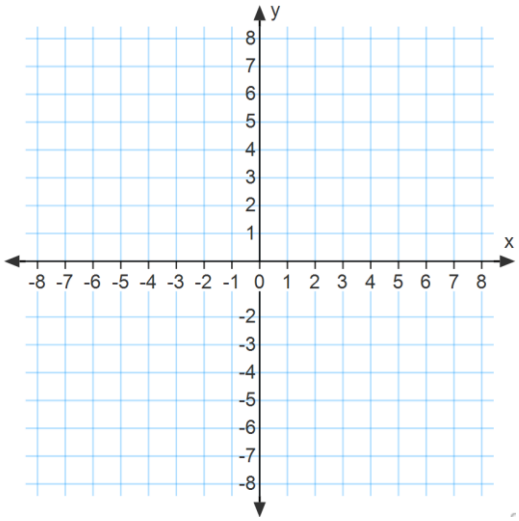


Let $f(x) = 12x^3 + 4$. Graph $f(x)$ and $g(x)$ on the same coordinate plane. Describe $g(x)$ as a transformation of $f(x)$.

42. $g(x) = f(-x)$



43. $g(x) = -f(x) + 3$



Chapter 5, Part I

In 44 - 46, simplify completely. Assume that all expressions are defined.

44. $\dfrac{x^2 - 4x + 4}{5x^2 - 9x - 2}$

45. $\dfrac{x}{x^2 - 1} \cdot \dfrac{x^2 - 5x + 4}{2x^2 + 2x} \div \dfrac{x^2 - 16}{2x}$

46. $\dfrac{3}{x^2 - 7x + 12} + \dfrac{5x}{x - 4}$

In 47 - 48, solve each equation.

47. $3 = \frac{2}{x} - \frac{4}{3x}$

48. $\frac{1}{x+1} + \frac{1}{x-1} = \frac{2}{x^2-1}$

49. The monthly minimum payment p due on a certain credit card with a fixed rate varies directly as the balance b, and $p = \$19.80$ when $b = \$1100$. Find p when $b = \$3000$.

50. The time t that it takes Hannah to bike to school varies inversely as her average speed s. If she can bike to school in 25 min when her average speed is 6mi/h, what would her average speed need to be to get to school in 20 min?