1st Nine Weeks Review

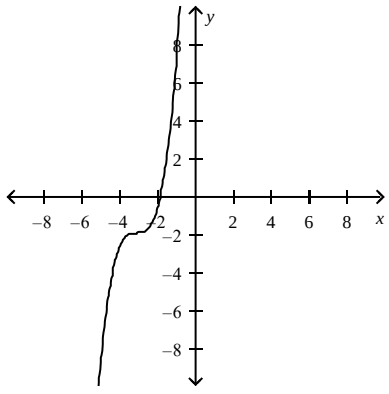
1. Represent the following domains in interval notation.
   a. $1 \le x < 9$
   b. $-\infty < x \le 0 \cup 4 < x$
   c. $-10 \le x \le -5$
2. Explain the vertical line test. What does it prove? Explain the horizontal line test. What does it mean in terms of *f(x)?*

3. Identify the 3 Quadratic Forms and all characteristics of each.
   Vertex Form(Transformation) General Form(Polynomial) X-Intercept Form

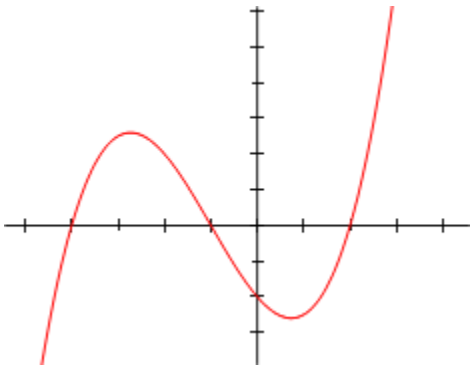
4. Change the function $f(x) = x^2 - 8x + 10$ to Vertex Form(Transformation)

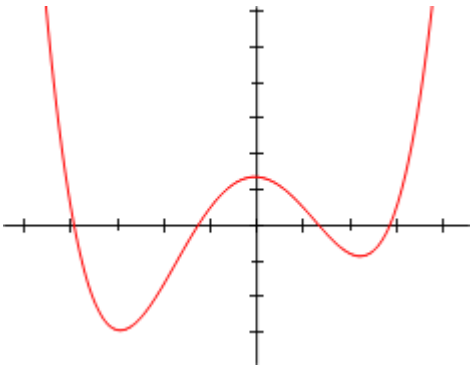
5. Given $f(x) = x^2$ and $g(x) = \sqrt{x+3}$ find the following functions and the <u>domains</u>,
   a. $f + g(x)$
   b. $\frac{f}{g}(x)$
   c. $g \circ f(x)$
   d. $f \circ g(x)$

6. Graph the inverse of the function f(x) on the same graph.



7. Find the local Max/Min and estimate the coordinates of the inflection points. Determine Intervals of concave up and concave down. Determine Intervals of Increasing and Decreasing.

a. 

b. 

8. Find the Domain of the following function: $\dfrac{x+2}{x(x^2-81)}$

11. Find and simplify the Difference Quotient for the following.

$f(x)=3x^2-2x-1$ $\qquad$ $g(x)=\frac{-3}{3-x}$

Factor the following.

12. $6x^2-19x-7$

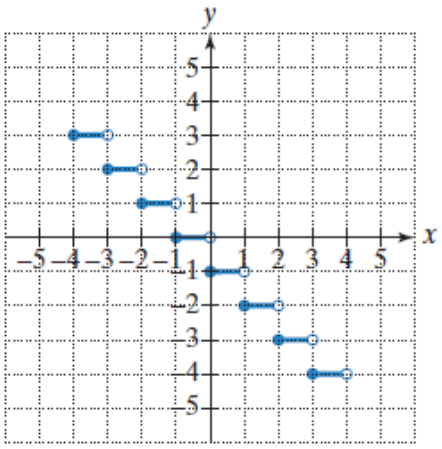
13. $-25x^2+64y^2$

14. $16x^2-24x+9$

15. x^4+125x

15.5. $64x^3+27y^6$

16. Use the given graph to evaluate the following two expressions.



Find

$$\sqrt{f(-1.5) + f(-0.9)} - [f(\pi)]^2 + f(-3) \div f(1) \cdot f(-\pi).$$

Find

$$\sqrt{f(-2.5) - f(1.9)} - [f(-\pi)]^2 + f(-3) \div f(1) \cdot f(\pi).$$

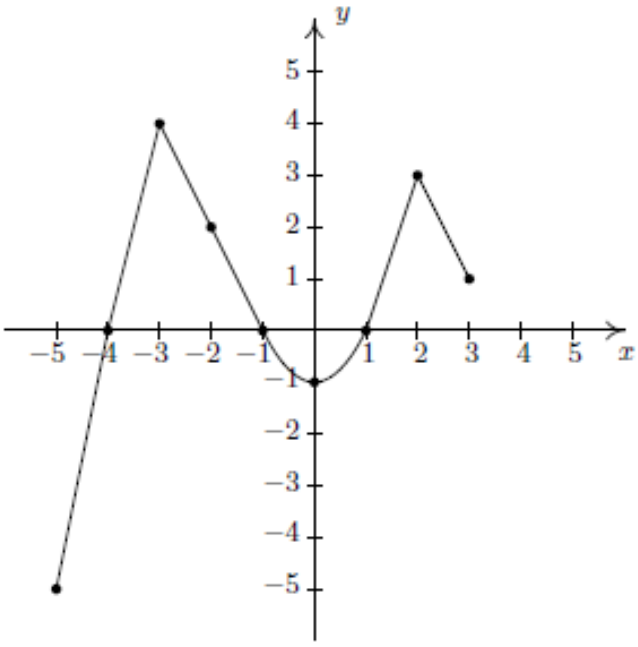
17. For the given Piecewise function. Evaluate the following.

$$g(x) = \begin{cases} x + 5 & \text{if } x \geq -5 \\ -(x + 5) & \text{if } x < -5 \end{cases}$$

a. $g(0)$ **b.** $g(-6)$ **c.** $g(-5)$

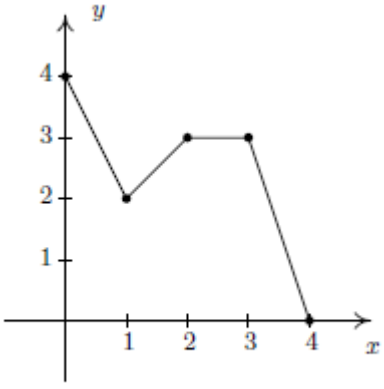
d. Find the Domain.
e. Find the Range.

18. Use the graph of f(x) below to answer the following questions.



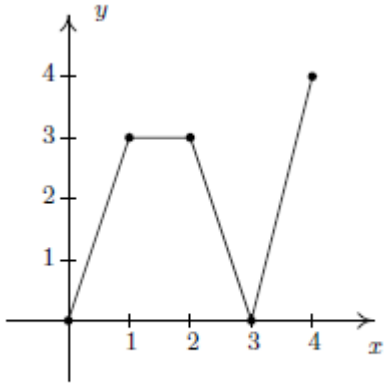
a) Find the domain of *f*
b) Find the range of *f.*
c) Determine *f(-2)*
d) Solve *f*(*x*) = 4
e) Identify the x-intercepts
f) Identify the y-intercepts
g) Find all zeros of *f*
h) Solve for *f*(x) >0
i) Find the intervals where *f* is increasing
j) Find the intervals where *f* is decreasing
k) Find the coordinates of all maximums if any
l) Find the coordinates of all minimums if any
m) Solve for *f*(x) < 0

Use the following graphs to find the function value.



$y = f(x)$

a) $f + g\ (0)$
b) $f + g\ (1)$
c) $f - g\ (1)$
d) $f - g\ (2)$

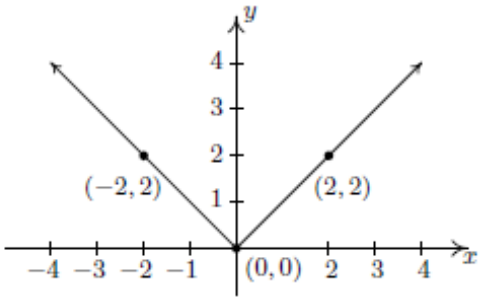


$y = g(x)$

e) $fg(2)$
f) $fg(1)$
g) $\frac{f}{g}(4)$

h) $\frac{g}{f}(2)$

Use the graph of the Absolute Value function given below to graph y using transformations. Identify the transformation(s) for each problem below.



The graph for Ex. 19 - 27

19. $y = f(x) + 1$
20. $y = f(x) - 2$
21. $y = f(x + 1)$
22. $y = f(x - 2)$
23. $y = 2f(x)$
24. $y = f(2x)$
25. $y = 2 - f(x)$
26. $y = f(2 - x)$
27. $y = 2 - f(2 - x)$

Given the parent function $f(x) = \sqrt{x}$ find a formula(equation) for a function g whose graph is obtained from *f* from the given sequence of transformations.

28. shift right 2 units, shift down 2 units
29. reflect across the x-axis, shift up 1 unit
30. shift left 3 units, vertical stretch by a factor of 2, shift down 4 units, horizontal stretch by a factor of 3
31. reflect across the y-axis, shift left 7 units, vertical compression by 5

Use the pair of given functions to find the domain of the indicated function, then find and simplify an expression for it.

- $(f + g)(x)$
- $(f - g)(x)$
- $(fg)(x)$
- $\left(\frac{f}{g}\right)(x)$

11. $f(x) = 2x + 1$ and $g(x) = x - 2$
12. $f(x) = 1 - 4x$ and $g(x) = 2x - 1$
13. $f(x) = x^2$ and $g(x) = 3x - 1$
14. $f(x) = x^2 - x$ and $g(x) = 7x$
15. $f(x) = x^2 - 4$ and $g(x) = 3x + 6$
16. $f(x) = -x^2 + x + 6$ and $g(x) = x^2 - 9$

find and simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$ for the given function.

21. $f(x) = 2x - 5$

22. $f(x) = -3x + 5$

23. $f(x) = 6$

24. $f(x) = 3x^2 - x$

25. $f(x) = -x^2 + 2x - 1$

26. $f(x) = 4x^2$

Determine if the following pairs of functions are Inverses of one another.

1) $g(x) = 4 - \frac{3}{2}x$

$f(x) = \frac{1}{2}x + \frac{3}{2}$

2) $g(n) = \frac{-12 - 2n}{3}$

$f(n) = \frac{-5 + 6n}{5}$

3) $f(n) = \frac{-16 + n}{4}$

$g(n) = 4n + 16$

4) $f(x) = -\frac{4}{7}x - \frac{16}{7}$

$g(x) = \frac{3}{2}x - \frac{3}{2}$

5) $f(n) = -(n+1)^3$

$g(n) = 3 + n^3$

6) $f(n) = 2(n-2)^3$

$g(n) = \frac{4 + \sqrt[3]{4n}}{2}$

7) $f(x) = \frac{4}{-x-2} + 2$

$h(x) = -\frac{1}{x+3}$

8) $g(x) = -\frac{2}{x} - 1$

$f(x) = -\frac{2}{x+1}$

Find the inverse of each function.

9) $h(x) = \sqrt[3]{x} - 3$

10) $g(x) = \frac{1}{x} - 2$

11) $h(x) = 2x^3 + 3$

12) $g(x) = -4x + 1$

13) $g(x) = \frac{7x + 18}{2}$

14) $f(x) = x + 3$

15) $f(x) = -x + 3$

16) $f(x) = 4x$

Chapter 2 Absolute Value and Inequalities

Solve the following equations.

1. $|x| = 6$
2. $|3x - 1| = 10$
3. $|4 - x| = 7$
4. $4 - |x| = 3$
5. $2|5x + 1| - 3 = 0$
6. $|7x - 1| + 2 = 0$
7. $\frac{5 - |x|}{2} = 1$
8. $\frac{2}{3}|5 - 2x| - \frac{1}{2} = 5$
9. $|x| = x + 3$
10. $|2x - 1| = x + 1$
11. $4 - |x| = 2x + 1$
12. $|x - 4| = x - 5$
13. $|x| = x^2$
14. $|x| = 12 - x^2$
15. $|x^2 - 1| = 3$
16. $|3x - 2| = |2x + 7|$
17. $|3x + 1| = |4x|$
18. $|1 - 2x| = |x + 1|$
19. $|4 - x| - |x + 2| = 0$
20. $|2 - 5x| = 5|x + 1|$
21. $3|x - 1| = 2|x + 1|$

Solve the Following Inequalities. Solutions should be in interval notation.

1. $|3x - 5| \leq 4$
2. $|7x + 2| > 10$
3. $|2x + 1| - 5 < 0$
4. $|2 - x| - 4 \geq -3$
5. $|3x + 5| + 2 < 1$
6. $2|7 - x| + 4 > 1$
7. $2 \leq |4 - x| < 7$
8. $1 < |2x - 9| \leq 3$
9. $|x + 3| \geq |6x + 9|$
10. $|x - 3| - |2x + 1| < 0$
11. $|1 - 2x| \geq x + 5$
12. $x + 5 < |x + 5|$
13. $x \geq |x + 1|$
14. $|2x + 1| \leq 6 - x$
15. $x + |2x - 3| < 2$
16. $|3 - x| \geq x - 5$
17. $x^2 + 2x - 3 \geq 0$
18. $16x^2 + 8x + 1 > 0$
19. $x^2 + 9 < 6x$
20. $9x^2 + 16 \geq 24x$
21. $x^2 + 4 \leq 4x$
22. $x^2 + 1 < 0$
23. $3x^2 \leq 11x + 4$
24. $x > x^2$
25. $2x^2 - 4x - 1 > 0$
26. $5x + 4 \leq 3x^2$

Write and solve an inequality involving absolute values for the given statement.

39. Find all real numbers x so that x is within 4 units of 2.
40. Find all real numbers x so that $3x$ is within 2 units of -1.
41. Find all real numbers x so that x^2 is within 1 unit of 3.
42. Find all real numbers x so that x^2 is at least 7 units away from 4.