2017-18

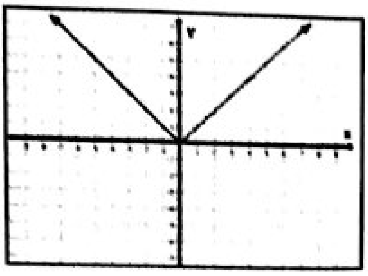
Algebra 2
Midterm Exam Review

Name: Key
Date: 1/19-1/23 Block: 3A

SHOW ALL WORK!!

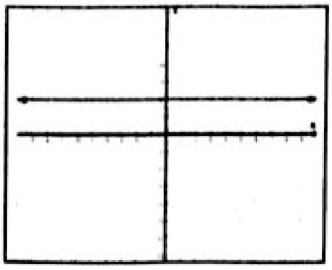
In 1 - 3, identify the parent function graphed by writing the name or the equation. Then identify the type of symmetry and the domain and range (using interval notation).

1.



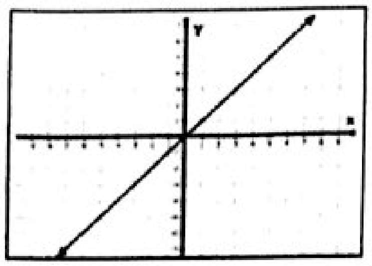
Parent Function: absolute value
Symmetry: y-axis
D: $(-\infty, \infty)$
R: $[0, \infty)$

2.



Parent Function: constant
Symmetry: y-axis
D: $(-\infty, \infty)$
R: $\{c\}$

3.



Parent Function: linear
Symmetry: origin
D: $(-\infty, \infty)$
R: $(-\infty, \infty)$

In 4 – 6, using the graph of $f(x) = |x|$ as a guide, describe the transformations of each function and identify its domain and range.

4. $g(x) = 2|x| - 4$

Transformations: vertical stretch by factor of 2, shift down 4
D: $(-\infty, \infty)$
R: $[-4, \infty)$

5. $h(x) = -2|x - 3| + 1$

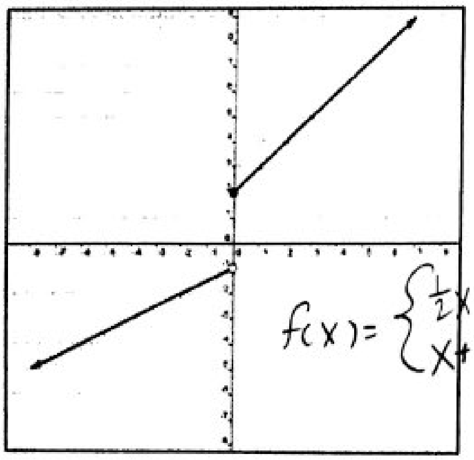
Transformations: shift right 3, up 1, reflection in x-axis, vert. stretch by 2
D: $(-\infty, \infty)$
R: $(-\infty, 1]$

6. $k(x) = 0.2|x + 1| - 2$

Transformations: left 1, down 2, vertical compression by 0.2
D: $(-\infty, \infty)$
R: $[-2, \infty)$

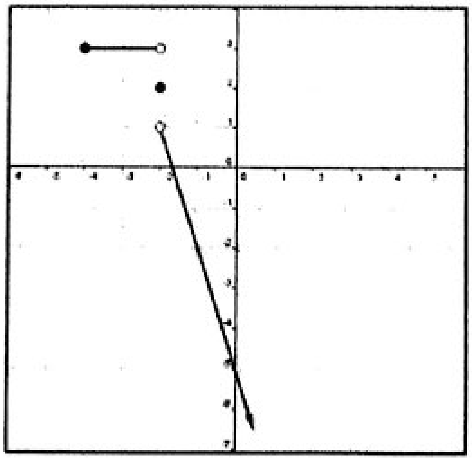
In 7 – 8, write a rule for the piecewise function.

7.



$$f(x) = \begin{cases} \frac{1}{2}x - 1, & x < 0 \\ x + 2, & x \geq 0 \end{cases}$$

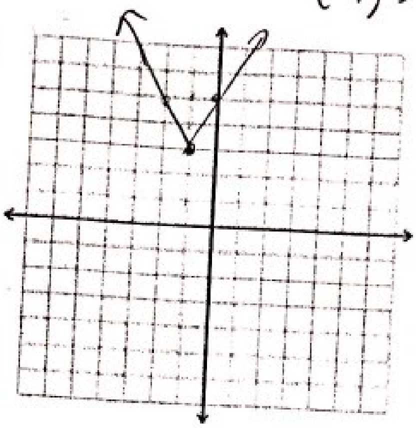
8.



$$f(x) = \begin{cases} 3, & -4 \leq x < -2 \\ 2, & x = -2 \\ -3x - 5, & x > -2 \end{cases}$$

In 9 – 10, graph the absolute value function. State the domain and range.

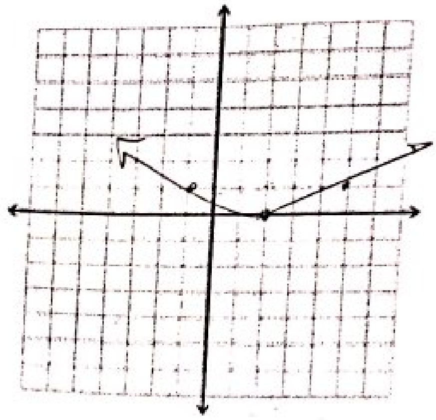
9. $f(x) = 2|x+1|+3$ Vertex $(-1, 3)$



D: $(-\infty, \infty)$

R: $[3, \infty)$

10. $f(x) = \frac{1}{3}|x-2|$ Vertex. $(2, 0)$



D: $(-\infty, \infty)$

R: $[0, \infty)$

In 11 – 12, solve each three variable system.

11. $2x - 2y + z = 3$
$-3\,(5y - z = -31)$
$-2\,(x + 3y + 2z = -21)$

$2x - 2y + z = 3$
$+\ -2x - 6y - 4z = 42$
$-8y - 3z = 45$
$-15y + 3z = 93$
$-23y = 138$
$y = -6$

$5(-6) - z = -31$
$z = 1$

$x - 18 + 2 = -21$
$x = -5$

$\boxed{(-5, -6, 1)}$

12. $3x + 2y = 12$
$2y - 5z = 1$
$5\,(x + y + z = 6)$

$2y - 5\cancel{z} = 1$
$5x + 5y + 5\cancel{z} = 30$

$-3\,(5x + 7y = 31)$
$5\,(3x + 2y = 12)$

$-15x - 21y = -93$
$15x + 10y = 60$
$-11y = -33$
$y = 3$

$3x + 6 = 12$
$3x = 6$
$x = 2$

$2 + 3 + z = 6$
$z = 1$

$\boxed{(2, 3, 1)}$

In 13 – 17, perform the indicated operation.

13. $(\cancel{-4x^4} + 3x^2 - 3x) + (\cancel{-12x^4} \cancel{-3x^3} + 5x^2 - 8x + 1)$

$\boxed{-16x^4 - 3x^3 + 8x^2 - 11x + 1}$

14. $(3x^2 - 7x + 4) - (-4x^2 - 12x + 8)$

$\boxed{7x^2 + 5x - 4}$

15. $(3x - 7)(2x + 1)$ $\boxed{6x^2 - 11x - 7}$

16. $(x - 1)(x + 3)(x + 4)$ $(x^2 + 2x - 3)(x + 4) = \boxed{x^3 + 6x^2 + 5x - 12}$

17. $(3x - 1)^2$ $\boxed{9x^2 - 6x + 1}$

18. ***Classify each function by its function family. Then describe the transformation of the parent function. State the Domain and Range.***

a. $g(x) = 7$

constant

D: $(-\infty, \infty)$

R: $\{7\}$

b. $h(x) = x^2 + 5$

quadratic

vertical shift up 5

D: $(-\infty, \infty)$

R: $[5, \infty)$

c. $h(x) = x - 9$

linear

vertical shift down 9

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

d. $g(x) = \frac{1}{3}|x - 1| + 4$

absolute value

horizontal compression by 1/3, right 1, up 4

D: $(-\infty, \infty)$

R: $[4, \infty)$

e. $g(x) = -(x + 6)^2 - 5$

quadratic

reflection in x-axis, left 6, down 5

D: $(-\infty, \infty)$

R: $(-\infty, -5]$

f. $h(x) = 3x - 7$

linear

vertical stretch by 3, down 7

D: $(-\infty, \infty)$

R: $(-\infty, \infty)$

Factor completely.

19. $x^2 - 3x - 28$

$(x-7)(x+4)$

20. $x^2 + 19x + 90$

$(x+10)(x+9)$

21. $4x^2 - 1$

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

22. $x^4 - 14x^2 + 49$

$(x^2-7)^2$

23. $8 - x^3$

$(2-x)(4+2x+x^2)$

24. $3x^2 - 27$

$3(x^2-9)$

$3(x+3)(x-3)$

25. $x^3 + x^2 - 9x - 9$

$x^2(x+1) - 9(x+1)$

$\boxed{(x+3)(x-3)(x+1)}$

26. $8x^3 - 18x^2 - 5x$

$x(8x^2-18x-5)$

$x(4x+1)(2x-5)$

27. $x^2 - 5x - 36$

$(x-9)(x+4)$

28. $x^4 - 64$

$(x^2+8)(x^2-8)$

29. $4x^2 - 3x - 1$

$(4x+1)(x-1)$

30. $x^3 + 5x^2 + x + 5$

$x^2(x+5) + 1(x+5)$

$(x^2+1)(x+5)$

Find the value of c that makes the expression a perfect square trinomial. Then write the expression as the square of a binomial.

31. $x^2 + 8x + c$ $C = 16$

$(x+4)^2$

32. $x^2 + 14x + c$

$C = 49$

$(x+7)^2$

Solve using any method.

33. $x^2 = -64$

$x = \pm 8i$

34. $2x^2 + 5 = 41$

$2x^2 = 36$

$x^2 = 18$

$x = \pm 3\sqrt{2}$

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

$x = \frac{-1 \pm \sqrt{1-4(1)(-1)}}{2}$

$x = \frac{-1 \pm \sqrt{5}}{2}$

36. $2x^2 + 3x + 5 = 0$

$x = \frac{-3 \pm \sqrt{9-4(2)(5)}}{2(2)}$

$x = \frac{-3 \pm i\sqrt{31}}{4}$

37. $x^4 - 5x^2 + 4 = 0$

$(x^2 - 4)(x^2 - 1) = 0$

$(x+2)(x-2)(x+1)(x-1) = 0$

$\{-2, 2, -1, 1\}$

38. $(3x+8)^2 = 36$

$3x + 8 = \pm 6$

$3x = -8 \pm 6$

$x = \frac{-8 \pm 6}{3} = \{-2/3, -14/3\}$

Identify the number and type of solutions. $b^2 - 4ac$

39. $x^2 - 5x - 14 = 0$

\# and type of solutions: 2 real

$(-5)^2 - 4(1)(-14)$

81

40. $4x^2 - 12x = -9$

$4x^2 - 12x + 9 = 0$

\# and type of solutions: 1 real

$(-12)^2 - 4(4)(9)$

0