Name: _____ Date: _____

Honors Precalculus Math Department

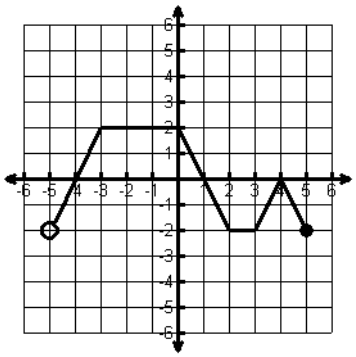
Summer Math Packet for Students Entering Honors Precalculus

We are pleased that you have chosen to continue your math sequence by enrolling in Honors Precalculus for next year. To help ensure your success in Honors Precalculus, we have created a summer math packet. This packet contains material that you must have knowledge of when entering the first day of the course. Your work must be clearly shown where appropriate. **NO WORK = NO CREDIT!**

Section 1: FUNCTIONS

DIRECTIONS: Identify the Domain and Range of each of the relations below using interval notation.

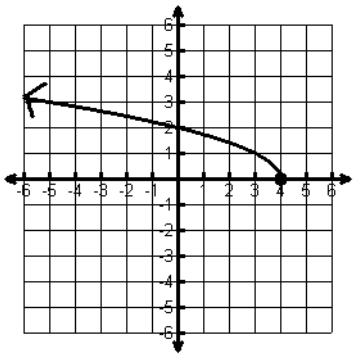
(1)



Domain: _____

Range: _____

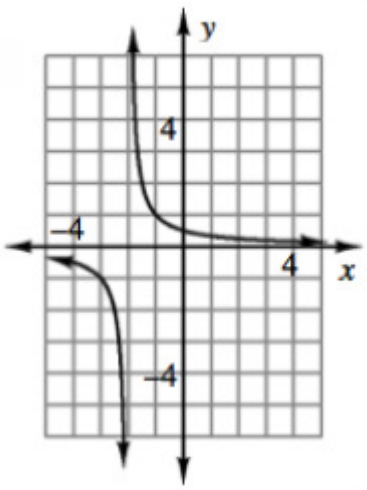
(2)



Domain: _____

Range: _____

(3)



Domain: _____

Range: _____

DIRECTIONS: Identify the Domain of each of function given below using interval notation.

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

Domain: _____

(5) $f(x) = \sqrt{x-4}$

Domain: _____

(6) $f(x) = \dfrac{x+3}{x^2+x-6}$

Domain: _____

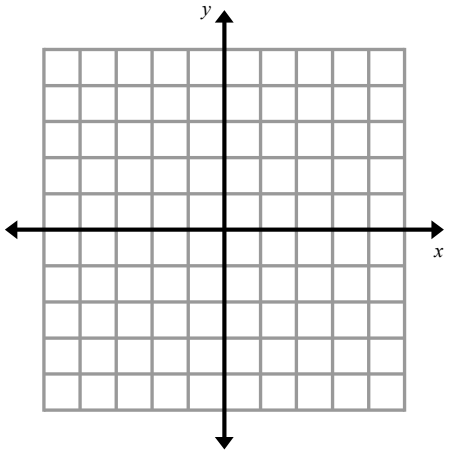
DIRECTIONS: Given the functions below, perform the requested function operation.

$f(x) = x^2 + 3x - 5$	$g(x) = 2x - 9$	$h(x) = 3x$

(7) $(f + g)(x) =$	(8) $(h - f)(x) =$	(9) $(h \cdot g)(x) =$
(10) $(f + h)(-2) =$	(11) $(h - g)(3) =$	(12) $(g \cdot f)(0) =$
(13) $(g \circ f)(x) =$	(14) $(f \circ h)(x) =$	(15) $f\big(g(h(-1))\big) =$

DIRECTIONS: Find the inverse, $f^{-1}(x)$, of the function below algebraically. Then verify by graphing.

(16) $f(x) = 2x - 2$



Section 2: FACTORING

DIRECTIONS: Use your factoring strategies to factor each polynomial function completely, if possible.

(17) $3x^2 - 12x$

(18) $25x^2 - 49$

(19) $x^2 - 10x + 21$

(20) $-2x^2 - 24x - 54$

(21) $6x^2 - 11x + 4$

(22) $5x^3 - 7x^2 - 20x + 28$

(23) $8x^3 + 125$

(24) $27x^3 - 1$

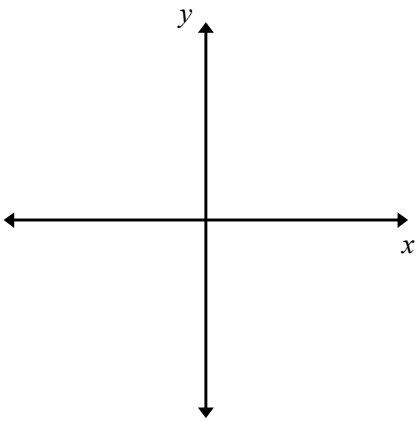
(25) $x^4 - 81$

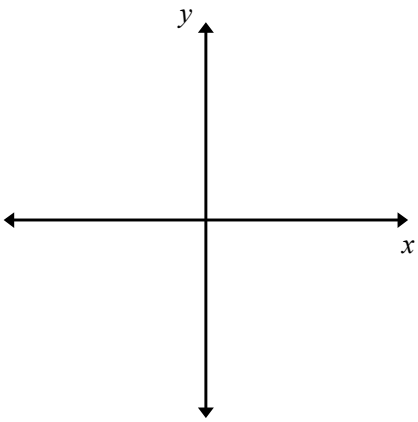
(26) $x^6 - 8x^3 - 48$

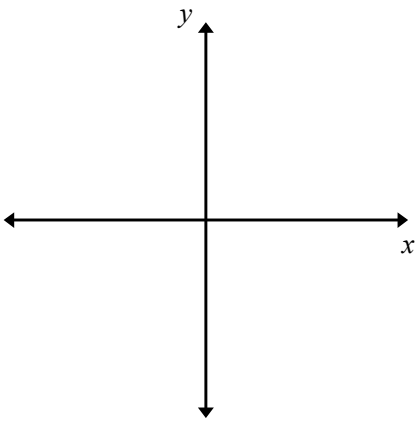
Section 3: QUADRATIC FUNCTIONS

DIRECTIONS: Sketch the graph of the quadratic function using key points and symmetry.

Standard Form	Vertex Form	Intercept Form
(27) $f(x) = -2x^2 - 8x - 5$	(28) $f(x) = \frac{1}{2}(x+2)^2 + 1$	(29) $f(x) = -(x-4)(x+2)$
Vertex: _____	Vertex: _____	Vertex: _____
y-intercept = _____	y-intercept = _____	x-intercept(s) = _____
		y-intercept = _____







DIRECTIONS: Solve the Quadratic Equation using the requested method.

(30) **Completing the Square:** $x^2 - 10x + 19 = 0$

(31) **Quadratic Formula:** $2x^2 - 4x = -5$

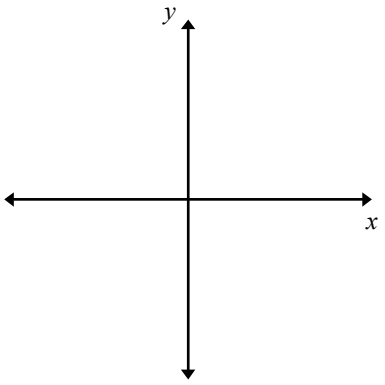
Section 4: POLYNOMIAL FUNCTIONS

DIRECTIONS: Sketch the polynomial function using intercepts, multiplicity rules, and the lead coefficient test.

(32) $f(x) = (x-2)(x+3)$

Zeros: _____

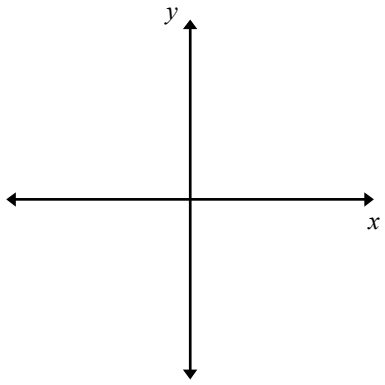
y-intercept = _____



(33) $f(x) = (x-2)^2(x+3)$

Zeros: _____

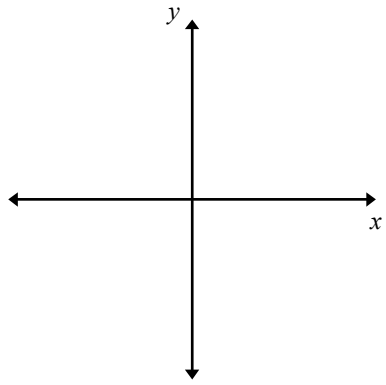
y-intercept = _____



(34) $f(x) = (x-2)^3(x+3)$

Zeros: _____

y-intercept = _____



DIRECTIONS: Use polynomial division to answer the following questions.

(35) Use synthetic division to determine whether $x = 3$ is a zero of $f(x) = x^3 + 5x^2 - 12x - 35$? Justify your response.

(36) Use long division to determine whether $(3x^2 + 4x - 15)$ is a factor of $(6x^4 - x^3 - 48x^2 + 37x + 30)$? Justify your response.

Section 5: RATIONAL FUNCTIONS

DIRECTIONS: Match each rational function with its graph below (A) – (F). Think asymptotes & intercepts!

(37) _____ $f(x) = \dfrac{x-2}{x}$

(38) _____ $f(x) = \dfrac{x^2}{x^2-4}$

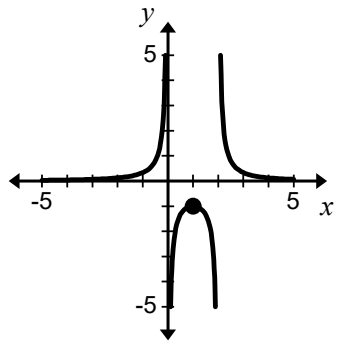
(39) _____ $f(x) = \dfrac{x^2+2x+1}{x}$

(40) _____ $f(x) = \dfrac{x+1}{x^2+3x+2}$

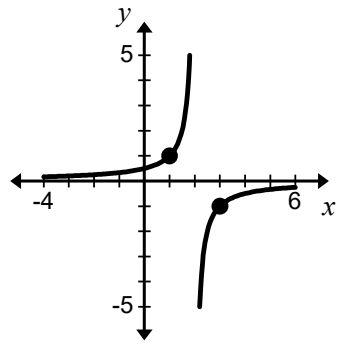
(41) _____ $f(x) = \dfrac{1}{x^2-2x}$

(42) _____ $f(x) = \dfrac{-1}{x-2}$

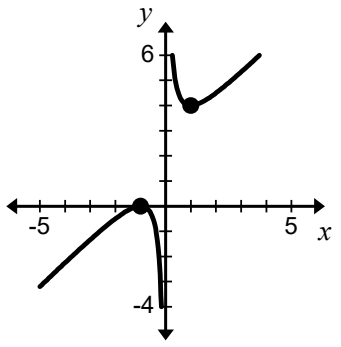
(A)



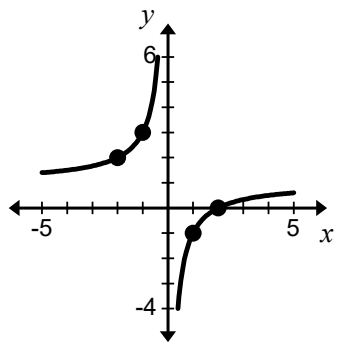
(B)



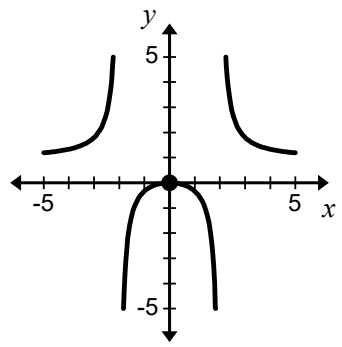
(C)



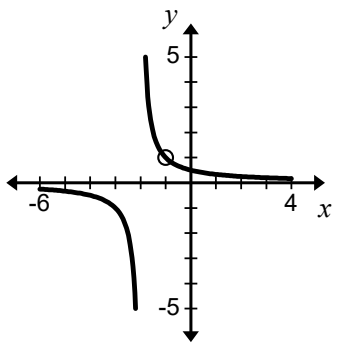
(D)



(E)



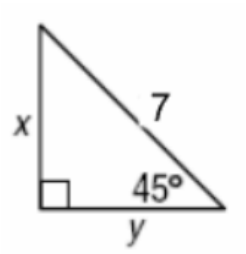
(F)



Section 6: SPECIAL RIGHT TRIANGLES

DIRECTIONS: Find the value of x and y in each figure.

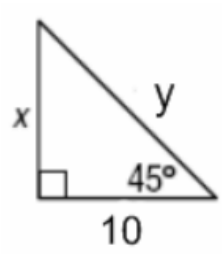
(43)



$x =$ _____

$y =$ _____

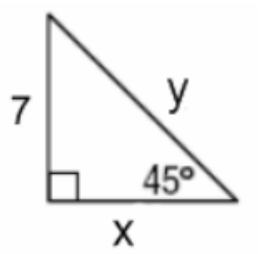
(44)



$x =$ _____

$y =$ _____

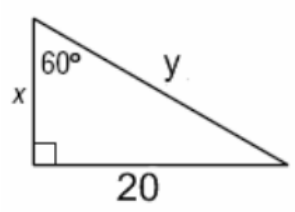
(45)



$x =$ _____

$y =$ _____

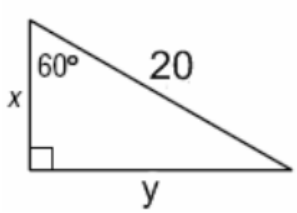
(46)



$x =$ _____

$y =$ _____

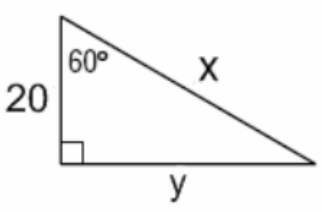
(47)



$x =$ _____

$y =$ _____

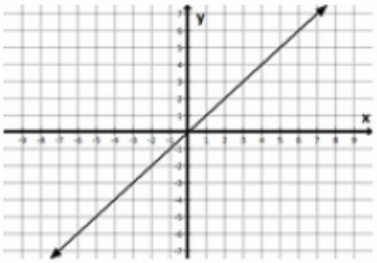
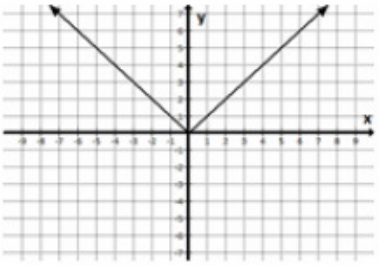
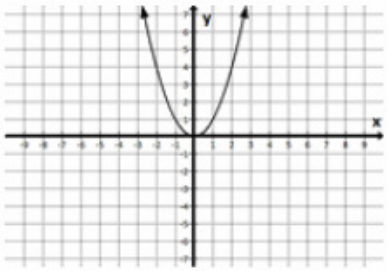
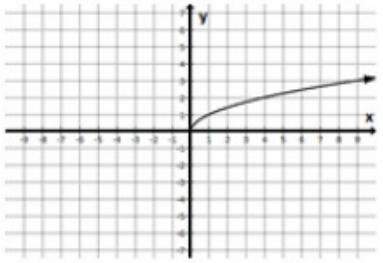
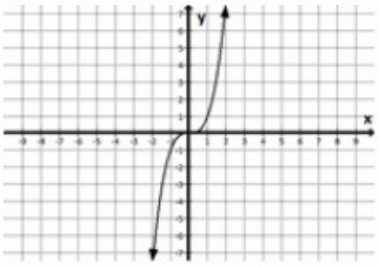
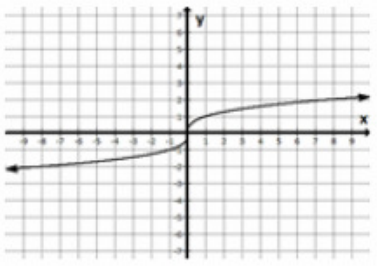
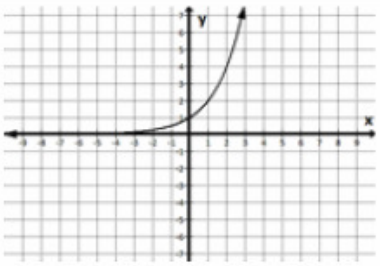
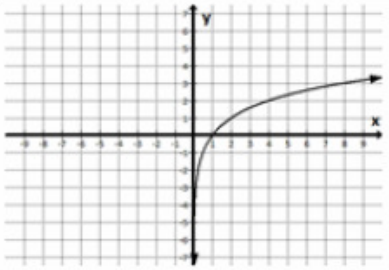
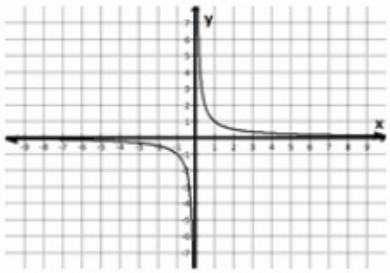
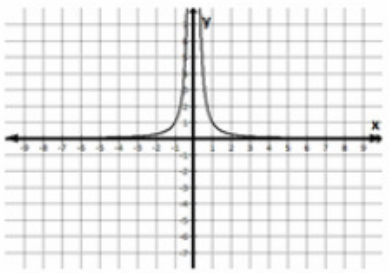
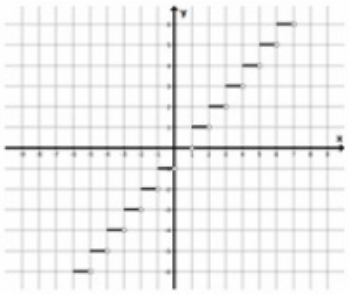
(48)



$x =$ _____

$y =$ _____

* * * * * BONUS MATERIAL * * * * *

Parent Function	Graph	Parent Function	Graph
$y = x$ **Linear**, Odd Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$ End Behavior: $x \to -\infty,\ y \to -\infty$ $x \to \infty,\ y \to \infty$		$y = \lvert x \rvert$ **Absolute Value**, Even Domain: $(-\infty, \infty)$ Range: $[0, \infty)$ End Behavior: $x \to -\infty,\ y \to \infty$ $x \to \infty,\ y \to \infty$	
$y = x^2$ **Quadratic**, Even Domain: $(-\infty, \infty)$ Range: $[0, \infty)$ End Behavior: $x \to -\infty,\ y \to \infty$ $x \to \infty,\ y \to \infty$		$y = \sqrt{x}$ **Radical**, Neither Domain: $[0, \infty)$ Range: $[0, \infty)$ End Behavior: $x \to \infty,\ y \to \infty$	
$y = x^3$ **Cubic**, Odd Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$ End Behavior: $x \to -\infty,\ y \to -\infty$ $x \to \infty,\ y \to \infty$		$y = \sqrt[3]{x}$ **Cube Root**, Odd Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$ End Behavior: $x \to -\infty,\ y \to -\infty$ $x \to \infty,\ y \to \infty$	
$y = b^x,\ b > 1$ **Exponential**, Neither Domain: $(-\infty, \infty)$ Range: $(0, \infty)$ End Behavior: $x \to -\infty,\ y \to 0$ $x \to \infty,\ y \to \infty$		$y = \log_b(x),\ b > 1$ **Log**, Neither Domain: $(0, \infty)$ Range: $(-\infty, \infty)$ End Behavior: $x \to 0^+,\ y \to -\infty$ $x \to \infty,\ y \to \infty$	
$y = \frac{1}{x}$ **Rational (Inverse)**, Odd Domain: $(-\infty, 0) \cup (0, \infty)$ Range: $(-\infty, 0) \cup (0, \infty)$ End Behavior: $x \to -\infty,\ y \to 0$ $x \to \infty,\ y \to 0$		$y = \frac{1}{x^2}$ **Rational (Inverse Squared)**, Even Domain: $(-\infty, 0) \cup (0, \infty)$ Range: $(0, \infty)$ End Behavior: $x \to -\infty,\ y \to 0$ $x \to \infty,\ y \to 0$	
$y = \text{int}(x) = [x]$ **Greatest Integer**, Neither Domain: $(-\infty, \infty)$ Range: $\{y : y \in \mathbb{Z}\}$ (integers) End Behavior: $x \to -\infty,\ y \to -\infty$ $x \to \infty,\ y \to \infty$		$y = C$ ($y = 2$ in the graph) **Constant**, Even Domain: $(-\infty, \infty)$ Range: $\{y : y = C\}$ End Behavior: $x \to -\infty,\ y \to C$ $x \to \infty,\ y \to C$