Name: ______________________ Date: ______________ Class: _______

Honors Pre-Calculus Unit 1 Test Review Sheet

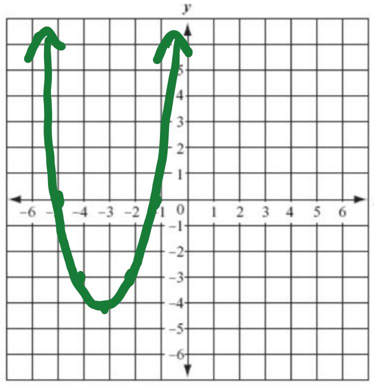
1. Find the domain of the following functions

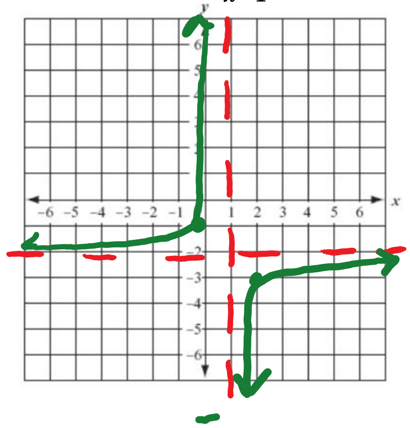
a. $f(x) = x^2 + 2x + 1$ b. $f(x) = \frac{2}{x^2-5x}$ c. $f(x) = \frac{2}{|x+8|}$

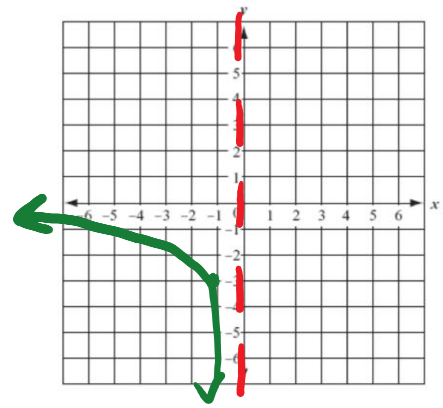
$(-\infty,\infty)$ $(-\infty,0)\cup(0,5)\cup(5,\infty)$ $(-\infty,-8)\cup(-8,\infty)$

2. Graph the functions

a. $y = (x+3)^2 - 4$ b. $y = -\frac{1}{x-1} - 2$ c. $y = log(-x) - 3$







3. Analyze the functions

a. $y = (x+1)^3 - 5$

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

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

Continuous: Continuous

Symmetry: None

Inc/Dec: $(-\infty,\infty)$

Bounded: None

Extrema: None

Asymptotes: None

End Behavior: $\lim_{x\to\infty} (x+1)^3-5=\infty$

$\lim_{x\to-\infty} (x+1)^3-5=-\infty$

b. $y = -3|x| - 4$

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

Range: $(-\infty,-4]$

Continuous: Continuous

Symmetry: even

Inc/Dec: Inc $(-\infty,0)$ Dec $(0,\infty)$

Bounded: above

Extrema: Abs Max $(0,-4)$

Asymptotes: None

End Behavior: $\lim_{x\to\infty} -3|x|-4=-\infty$

$\lim_{x\to-\infty} -3|x|-4=-\infty$

c. $y = 7e^x + 3$

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

Range: $(3,\infty)$

Continuous: continuous

Symmetry: None

Inc/Dec: $(-\infty,\infty)$

Bounded: Below

Extrema: None

Asymptotes: $y=3$

End Behavior: $\lim_{x\to\infty} 7e^x+3=\infty$

$\lim_{x\to-\infty} 7e^x+3=3$

4. Reflect the following functions over the x and y axis

a. $f(x) = -3x^3 + 4x^2 - 9x - 6$

x-axis: $f(x)=3x^3-4x^2+9x+6$

y-axis: $f(x)=-3(-x)^3+4(-x)^2-9(-x)-6$

$=3x^3+4x^2+9x-6$

b. $f(x) = \frac{6x^2-4x+1}{3x-2}$

x: $f(x)=\frac{-6x^2+4x-1}{3x-2}$

y: $f(x)=\frac{6x^2+4x+1}{-3x-2}$

5. Determine if the function is continuous. If not, state the type of discontinuity.

a. $y = \frac{4}{x-2}$ b. $y = \frac{4x^2-9}{2x+3}$ c. $y = -\sin(4x)$ d. $y = 7int(x) - 3$

Infinite Point continuous Jump

6. Find the composition of functions and then evaluate the given function.

a. $f(x) = 2x - 5 \quad g(x) = x^2 - 9$

i. $f(g(x)) = 2(x^2-9)-5$
$= 2x^2 - 23$

ii. $g(f(x)) = (2x-5)^2 - 9$
$= 4x^2 - 20x + 16$

iii. $f(g(-2)) = 2(-2)^2 - 23$
$= -15$

b. $f(x) = \sqrt{x-5} \quad g(x) = 6e^x$

i. $f(g(x)) = \sqrt{6e^x - 5}$

ii. $g(f(x)) = 6e^{\sqrt{x-5}}$

iii. $g(f(5)) = 6e^{\sqrt{5-5}}$
$= 6$

7. Decompose the functions: find $f(x)$ and $g(x)$ if $h(x) = f(g(x))$ *there are multiple answers

a. $h(x) = 6x^2 - 5$

$f(x) =$ $x-5$

$g(x) =$ $6x^2$

b. $h(x) = \frac{7}{x^3-1}$

$f(x) =$ $7/x$

$g(x) =$ $x^3 - 1$

c. $h(x) = \sqrt{5x+2} - 9$

$f(x) =$ $\sqrt{x} - 9$

$g(x) =$ $5x+2$

8. Write the function that has the following characteristics:

a. Quadratic: Shifted left 2, reflect over x axis, up 5 $y = -(x+2)^2 + 5$

b. Reciprocal: Vertical stretch 6, reflect over y axis, right 7 $y = \frac{6}{-x+7}$

c. Write the transformations: $w(x) = -\sqrt{x-3} + 4$
$w'(x) = \frac{3}{4}\sqrt{x+1} - 2$

Reflect x-axis, left 4, vertical shrink of 3/4, down 6

9. Find the inverse of the following functions

a. $y = 5x - 4$

$x = 5y - 4$
$x + 4 = 5y$

$y^{-1} = \frac{x+4}{5}$

b. $y = \frac{2x+1}{6-7x}$

$x = \frac{2y+1}{6-7y}$
$6x - 7xy = 2y + 1$
$6x - 1 = y(7x+2)$

$y^{-1} = \frac{6x-1}{7x+2}$

c. Evaluate $y^{-1}(2)$ if $y = \sqrt{4x+1}$

$x = \sqrt{4y+1}$
$x^2 = 4y + 1 \quad y^{-1} = \frac{x^2-1}{4}$

$y^{-1}(2) = \frac{3}{4}$

10. Prove the functions are inverses using composition. $f(x) = \frac{-x+3}{4x-5}$, $g(x) = \frac{5x+3}{4x+1}$

$f(g(x)) = \dfrac{-\left(\frac{5x+3}{4x+1}\right)+3}{4\left(\frac{5x+3}{4x+1}\right)-5} = \dfrac{\frac{-5x-\cancel{3}+12x+\cancel{3}}{\cancel{4x+1}}}{\frac{\cancel{20x}+12-\cancel{20x}-5}{\cancel{4x+1}}}$

$= \frac{7x}{7} = x$ ✓

$g(f(x)) = \dfrac{5\left(\frac{-x+3}{4x-5}\right)+3}{4\left(\frac{-x+3}{4x-5}\right)-1}$

$= \dfrac{\frac{-5x+\cancel{15}+12x-\cancel{15}}{\cancel{4x-5}}}{\frac{-\cancel{4x}+12+\cancel{4x}-5}{\cancel{4x-5}}} = \frac{7x}{7} = x$ ✓