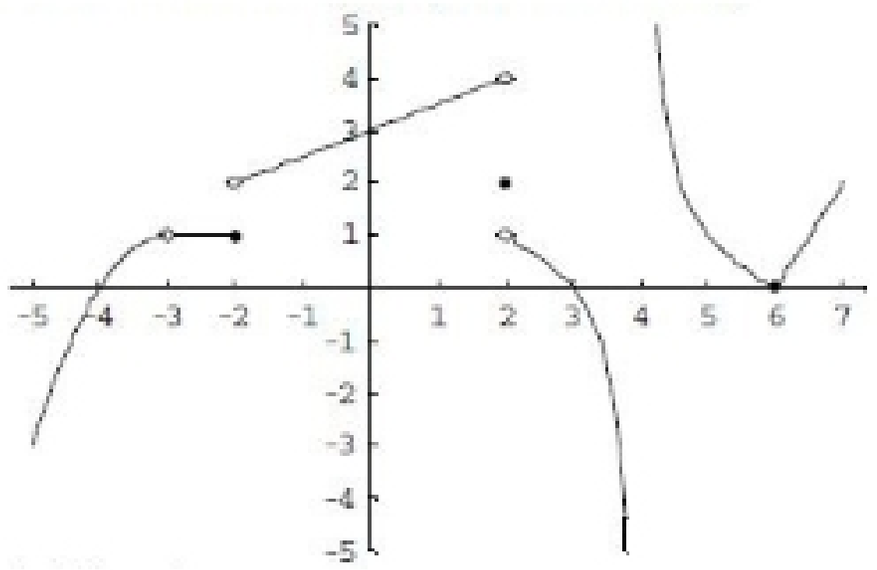
MATH 115: Worksheet 8 **October 14, 2014**

1. Consider the graph of a function f



   (a) Answer the following questions (you can assume f acts as it looks)

   i. $\lim_{x\to -3} f(x)$
   ii. $\lim_{x\to 2^+} f(x)$
   iii. $\lim_{x\to 4^+} f(x)$
   iv. $f(2)$
   v. $\lim_{x\to -2^+} f(x)$
   vi. $\lim_{x\to 2^-} f(x)$
   vii. $\lim_{x\to 6^+} f(x)$
   viii. $f(0)$
   ix. $\lim_{x\to -2^-} f(x)$
   x. $\lim_{x\to 4^-} f(x)$
   xi. $\lim_{x\to 2} f(x)$
   xii. $f(-3)$

   (b) List all points in the domain (-5,7) where the limit of f fails to exist.

   (c) List all points in the domain (-5,7) where the f does not exist OR f does not equal its limit

   (d) List any asymptotes of f and how you know.

2. Find the value of k such that limit of the function f below exists for all points in its domain:

$$f(x) = \begin{cases} x^2 + 2 & x \geq 0 \\ 3(x+k) - 1 & x < 0 \end{cases}$$

3. What is the domain and range of $\dfrac{1}{\ln(3x-2)}$?

4. A one-to-one function f has y-intercept of $(0, 6)$. How many x-intercepts does f^{-1} have? What is it/are they?

5. Without finding a formula for f, find x such that $f(x) = 4$ when $f^{-1}(x) = e^{x-2} + 3$.

6. Graph the following functions using a proper sequence of transformations:

(a) $a(x) = -3(x-2)^2 + 4$

(b) $b(x) = -3e^{x-2} + 4$

(c) $c(x) = -3\log(x-2) + 4$

(d) $d(x) = -3(x-2)^3 + 4$

7. What does it mean to find the "end" behavior of each of the following functions?

   (a) A polynomial (b) An exponential (c) A logarithm

8. Circle the correct choices: The graph of an exponential always has a vertical/horizontal asymptote and the graph of a logarithm always has a vertical/horizontal asymptote.

9. Fun with inverses

   (a) If $f(x)$ is a one-to-one function and its graph goes through the point (3,5), then the graph of $f^{-1}(x)$ must go through what point?

   (b) If $g(x)$ is a one-to-one function, use this table to determine the missing values

x	-1	0	1	2
$g(x)$		1	2	-1
$g^{-1}(x)$	2	-1	0	

   (c) If $f(x) = \frac{3x}{x-4}$ state the range of $f^{-1}(x)$ in interval notation.

10. For $f(x) = (x+2)(x-\frac{1}{2})(2x-3)(x-2)^2$, find

    (a) the long-term behavior

    (b) the x and y intercepts

    (c) the constand term, degree, and leading coefficient

    (d) the graph

An Ending Thought: *The surest way not to fail is to determine to succeed.*

– Richard Brinsley Sheridan