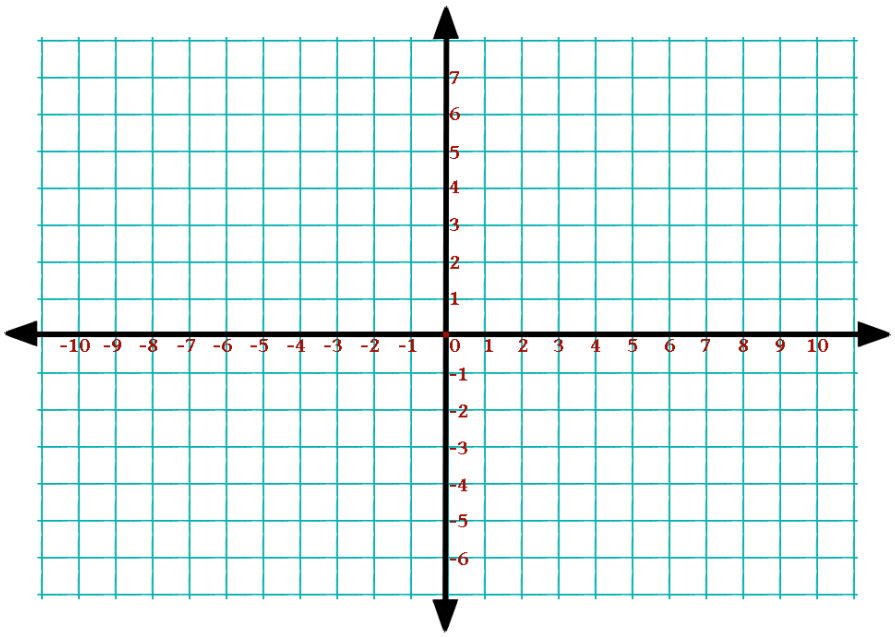
Name:_____ **7/18/2016**
Math 195-1XD **Exam 3**

Directions Answer all questions in the space provided. Show all work and box your final answers. Answers with no work shown will not receive full credit. Answers do not need to be simplified unless specifically stated. Good luck!

1. (10 points) Sketch the graph of the following rational function on the coordinate plane below. Be sure that the x-intercept(s) are accurate, that it is clear on which intervals the function is positive/negative, and label all vertical and horizontal asymptotes with their equations. Do not worry about the exact y-coordinates of the points on your graph.

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



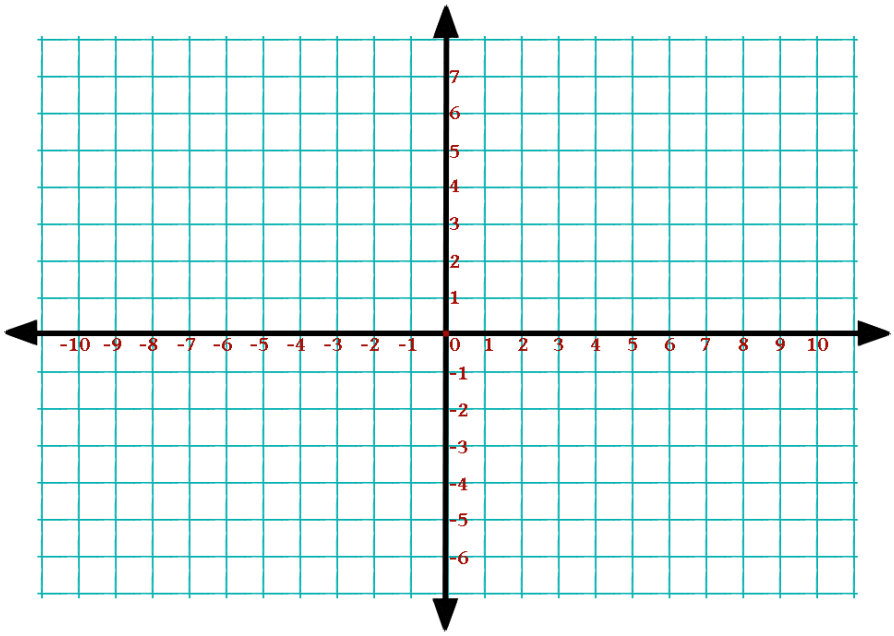
2. (10 points) Evaluate each of the following.
   (a) $\log_5(0.2)$

   (b) $\log_{10}\sqrt{10}$

   (c) $\ln\left(\frac{1}{e}\right)$

3. (10 points) Graph the following exponential function on the coordinate plane below. Label all vertical/horizontal asymptote(s) as well as 3 distinct points on the graph.

$$f(x) = 1 - 3^{-x}$$



4. (10 points) (a) Use log laws to expand the following logarithm.

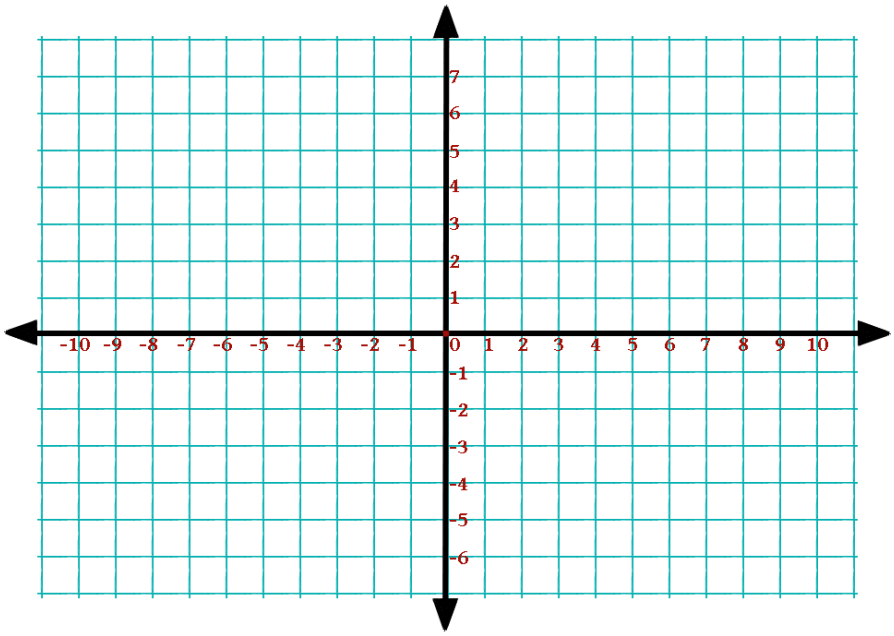
$$\log\left(\frac{\sqrt{x^3y^5}}{z^4}\right)$$

(b) Use log laws to combine the following logarithmic expression into a single logarithm.

$$2\left[\ln(x) + 2\ln(y) - 3\ln(z)\right]$$

5. (10 points) Graph the following logarithmic function on the coordinate plane below. Label all vertical/horizontal asymptote(s) as well as 3 distinct points on the graph.

$$f(x) = \log_3(x-1) - 2$$



6. (10 points) The half-life of strontium-90 is 32 years. How long will it take a 50mg sample to decay to a mass of 28mg?