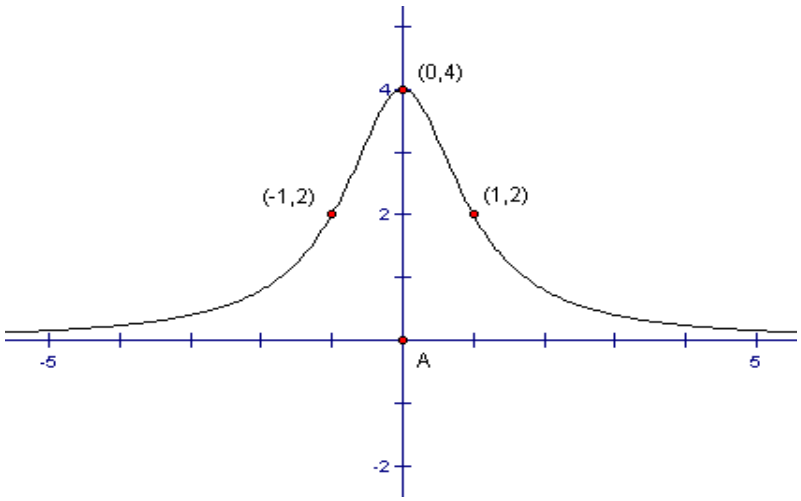
Math 138 Exam 3 Name:_____

Directions: Read each problem carefully. Remember to show all work in a logical and legible manner. To receive credit, **all answers must follow logically from the work that you show on your exam**. You may not share calculators or use the calculator function of a cell phone.

1. Use the graph of f (see figure) to sketch the graphs of *g* and *h*. Sketch them on the same plane with *f* and be sure to label your answers.



   a. $g(x) = f(x-2)+1$

   b. $h(x) = -f(x)-1$

   c. True or False: The graph of *f* has an inverse function.

2. Let $f(x) = 2x-3$ and $g(x) = 1-x$. Find the following and simplify:

   a. $(f-g)(x)$

   b. $(fg)(x)$

   c. $\left(\frac{f}{g}\right)(-2)$

3. Let $f(x) = \frac{3}{x^2}$ and $g(x) = x + 1$ Find the following and simplify:

   a. $(f \circ g)(x)$

   b. $(g \circ f)(3)$

4. Find the inverse function of $f(x) = \sqrt{x + 3}$.

5. Find all the real zeros of the function algebraically. Be sure to include the multiplicity of repeated zeros.

   $f(x) = x^4 - x^3 - 20x^2$

6. Describe the right-hand and left-hand behavior of the graph of the polynomial function.

$g(x) = 6 - 4x^2 + x - 3x^5$

7. Use long division to divide $6x^3 + 10x^2 + x + 8$ by $2x^2 + 1$.

8. In the following, use the formulas $A = P(1 + \frac{r}{n})^{nt}$ and $A = Pe^{rt}$.

You invest $2000 for 5 years. You have a choice between an account that pays 5.75% interest compounded monthly and an account that pays 5.5% compounded continuously. Which account earns more money? (You need to answer how much each earns, no points for guessing!)

9. Write the following in exponential form.

   a. $\log 10{,}000 = 4$

   b. $b = \log_5 2$

10. Write the following in logarithmic form.

   a. $3^4 = 81$

   b. $e^y = 54.6$

11. Evaluate the following. Round your result to three decimal places when necessary.

   a. $3\left(e^{-\sqrt{2}}\right)$

   b. $\log_{10} \sqrt{3}$

   c. $\text{Log}_2\left(\frac{1}{16}\right)$

   d. $\log_5 5^4$

   e. $e^{\ln x}$

10. Let $f(x) = \dfrac{x^2}{x^2 - 4}$. Find the following (if they do not occur, write "none".)

a. x-intercept(s):

b. y-intercept:

c. horizontal asymptote(s):

d. vertical asymptote(s):

e. slant asymptote(s):

f. Sketch the graph of f: