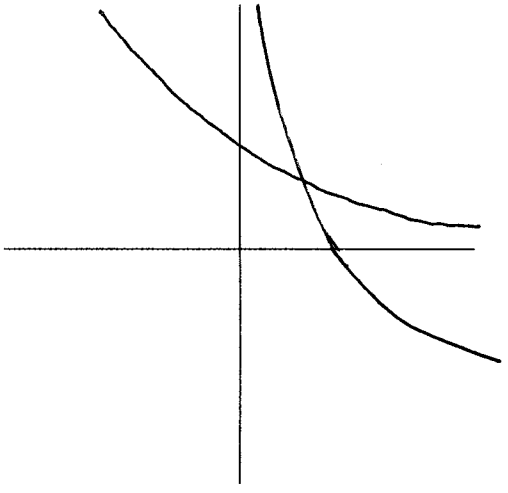
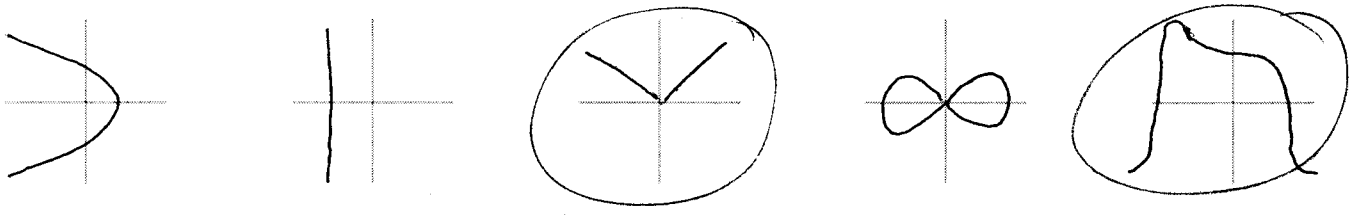
Math 114
Midterm 3
Mon Jun 16, 2008

Name: _____

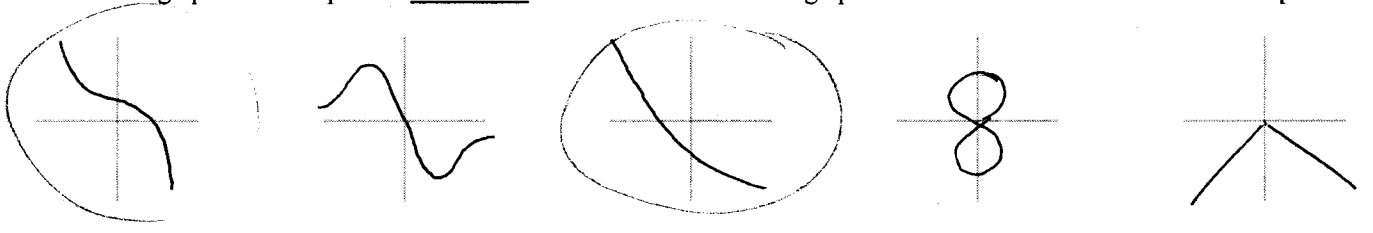
[1] The graph of the function $f(x)$ is shown below. Sketch the graph of the inverse function. **[6 POINTS]**



[2] Two of the graphs or tables below represent functions. Circle the two functions. **[6 POINTS]**



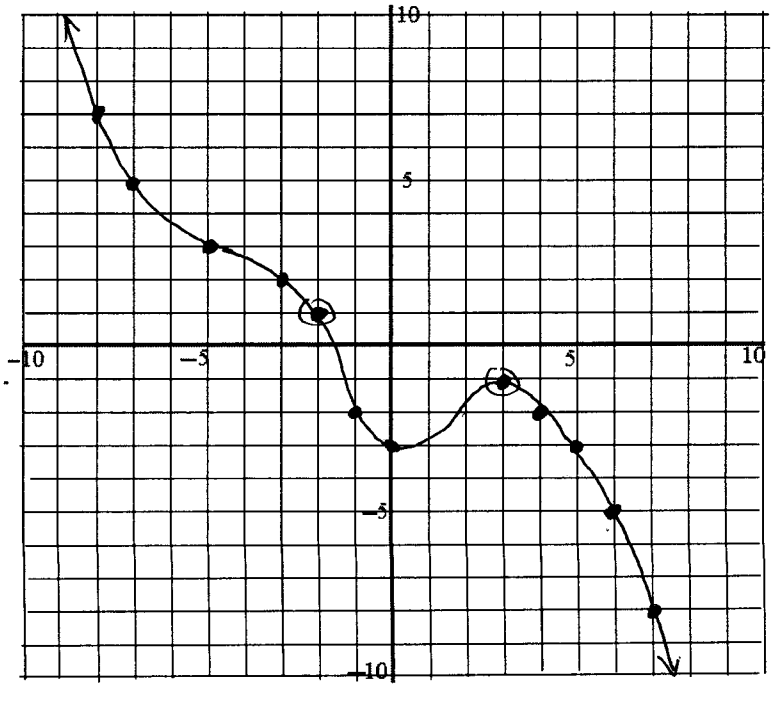
[3] Two of the graphs below represent ***one-to-one*** functions. Circle the two graphs. **[6 POINTS]**



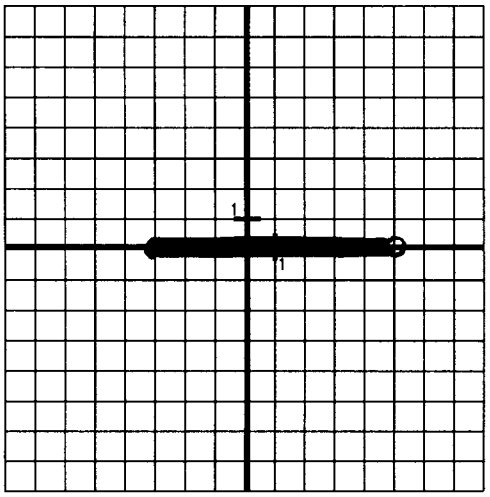
[4] Use the graph of the function $f(x)$ to the right to fill in the blanks below. **[6 POINTS]**

[a] $f(3) = -1$

[b] $f(-2) = 1$



[5] Which interval on x is graphed below ? **[4 POINTS]**



$[-3, 5)$

[6] If $f(x) = 2x^2 - 2x + 1$, find $f(a-3)$. Simplify your answer. **[7 POINTS]**

$$f(a-3) = 2(a-3)^2 - 2(a-3) + 1$$
$$= 2(a^2 - 6a + 9) - 2a + 6 + 1$$
$$= 2a^2 - 12a + 18 - 2a + 6 + 1$$
$$= 2a^2 - 14a + 25$$

[7] Find the inverse of the function $f(x) = \sqrt{3-x} - 2$. **You do NOT need to simplify your answer.** **[7 POINTS]**

$$y = \sqrt{3-x} - 2$$
$$x = \sqrt{3-y} - 2$$
$$x + 2 = \sqrt{3-y}$$
$$(x+2)^2 = 3 - y$$

$$(x+2)^2 - 3 = -y$$
$$3 - (x+2)^2 = y$$
$$f^{-1}(x) = 3 - (x+2)^2$$

[8] Find the exact solution of the equation $2^{x+2} = 3^{x-1}$. Also, use your calculator to find a decimal answer, rounded to 4 decimal places. **[10 POINTS]**

$$\log 2^{x+2} = \log 3^{x-1}$$
$$(x+2)\log 2 = (x-1)\log 3$$
$$x\log 2 + 2\log 2 = x\log 3 - \log 3$$
$$x\log 2 - x\log 3 = -2\log 2 - \log 3$$
$$x(\log 2 - \log 3) = -2\log 2 - \log 3$$
$$x = \frac{-2\log 2 - \log 3}{\log 2 - \log 3} = 6.1285$$

[9] The number of bacteria in a colony is given by $B(t) = 3.1(1.7)^t$. At what time were there 47 bacteria ? **[10 POINTS]**
Round your answer to 1 decimal place.

$$47 = 3.1(1.7)^t$$
$$\frac{47}{3.1} = 1.7^t$$
$$t = \log_{1.7} \frac{47}{3.1}$$
$$= \frac{\log \frac{47}{3.1}}{\log 1.7}$$
$$= 5.1$$

[10] Write $\log \frac{p^3}{mn^2}$ as the sums and/or differences and/or multiples of logarithms of numbers or single variables. **[5 POINTS]**

$$3\log p - \log m - 2\log n$$

[11] Write $2\log z - 3\log y + \log x$ as the logarithm of a single quantity. **[5 POINTS]**

$$\log \frac{z^2 x}{y^3}$$

[12] Draw the graph of the fuction $f(x) = 3 \cdot 2^{x-2} - 4$. Show the functions values of at least 4 points on your graph. **[10 POINTS]**
LABEL ALL ASYMPTOTES CLEARLY.

x				
$f(x)$				

ASYMPTOTE $y = -4$ →