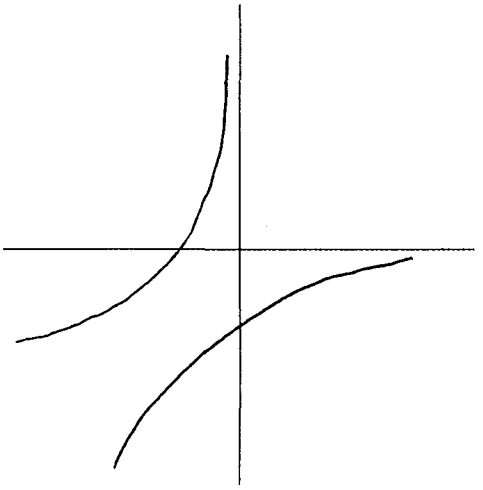
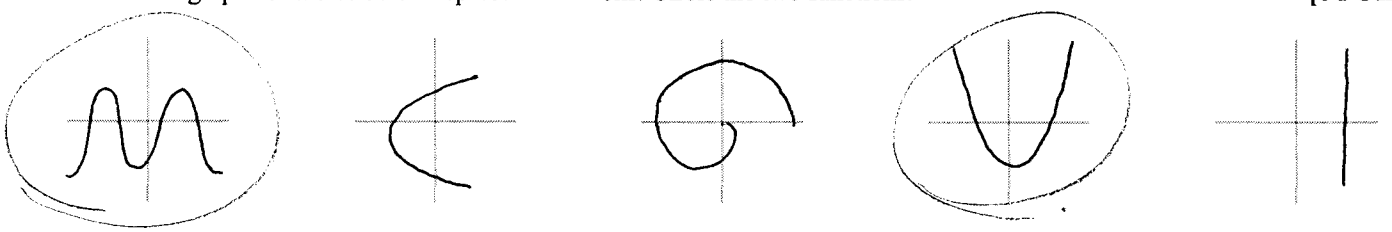
Math 114
Midterm 3
Mon Jun 16, 2008

Name: _____

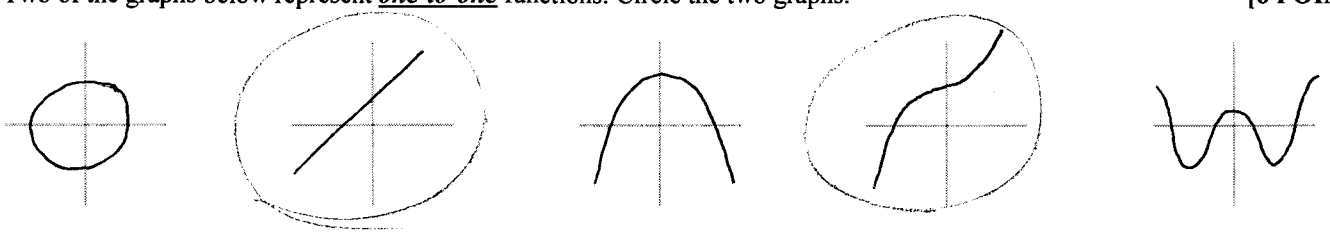
[1] The graph of the function $f(x)$ is shown below. Sketch the graph of the inverse function. **[6 POINTS]**



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



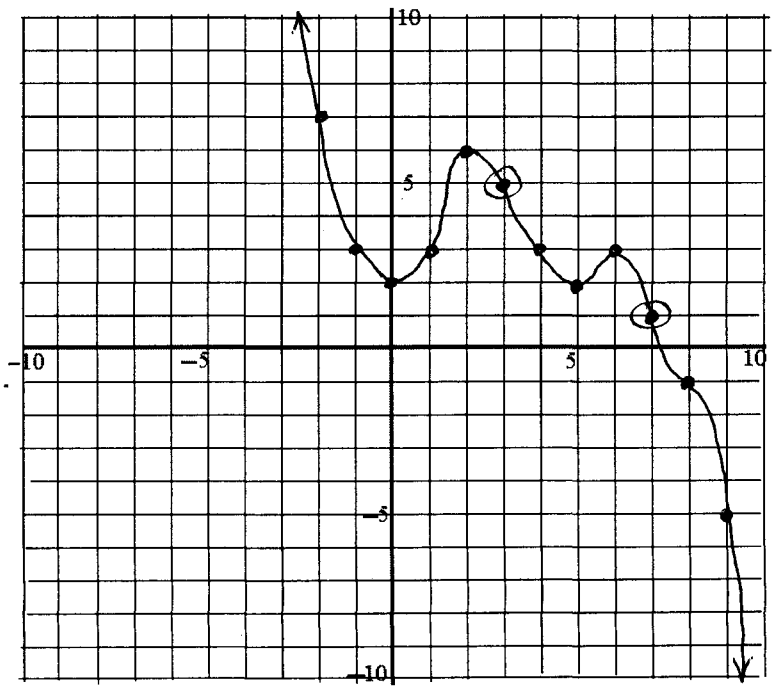
[3] Two of the graphs below represent ***one-to-one*** functions. Circle the two graphs. **[6 POINTS]**



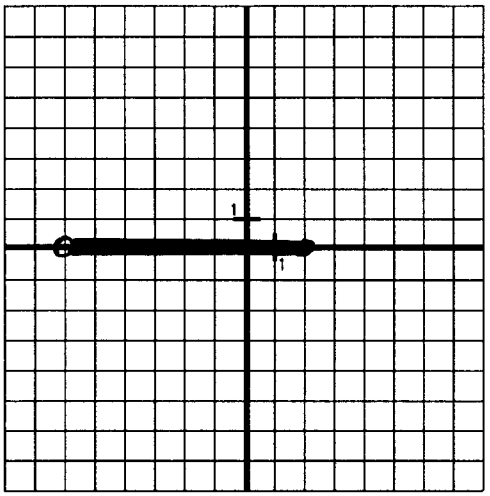
[4] Use the graph of the function $f(x)$ to the right to fill in the blanks below. **[6 POINTS]**

[a] $f(3) = \underline{5}$

[b] $f(\underline{7}) = 1$



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



$(-6, 2]$

[6] If $f(x) = 2x^2 - 4x + 1$, find $f(a-2)$. Simplify your answer. **[7 POINTS]**

$$f(a-2) = 2(a-2)^2 - 4(a-2) + 1$$
$$= 2(a^2 - 4a + 4) - 4a + 8 + 1$$
$$= 2a^2 - 8a + 8 - 4a + 8 + 1$$
$$= 2a^2 - 12a + 17$$

[7] Find the inverse of the function $f(x) = \sqrt{6-x} + 5$. **You do NOT need to simplify your answer.** **[7 POINTS]**

$$y = \sqrt{6-x} + 5$$
$$x = \sqrt{6-y} + 5$$
$$x - 5 = \sqrt{6-y}$$
$$(x-5)^2 = 6 - y$$
$$(x-5)^2 - 6 = -y$$
$$6 - (x-5)^2 = y$$
$$f^{-1}(x) = 6 - (x-5)^2$$

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

$$\log 3^{x+2} = \log 4^{x-1}$$
$$(x+2)\log 3 = (x-1)\log 4$$
$$x\log 3 + 2\log 3 = x\log 4 - \log 4$$
$$x\log 3 - x\log 4 = -2\log 3 - \log 4$$
$$x(\log 3 - \log 4) = -2\log 3 - \log 4$$
$$x = \frac{-2\log 3 - \log 4}{\log 3 - \log 4} = 12.4565$$

[9] The number of bacteria in a colony is given by $B(t) = 3.5(1.6)^t$. At what time were there 51 bacteria ? Round your answer to 1 decimal place. **[10 POINTS]**

$$51 = 3.5(1.6)^t$$

$$\frac{51}{3.5} = 1.6^t$$

$$t = \log_{1.6} \frac{51}{3.5}$$

$$= \frac{\log \frac{51}{3.5}}{\log 1.6}$$

$$= 5.7$$

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

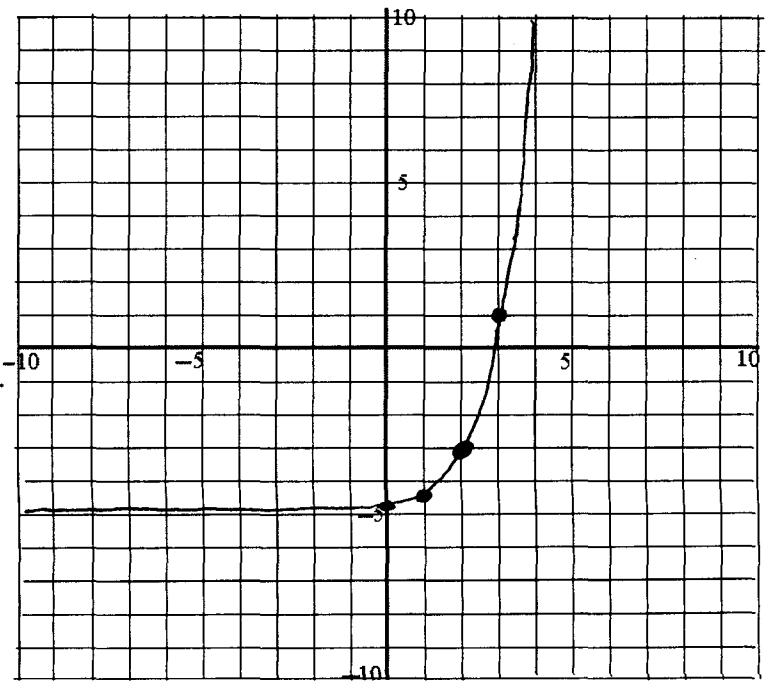
$$3\log a - \log b - 2\log c$$

[11] Write $2\log p - 3\log m + \log n$ as the logarithm of a single quantity. **[5 POINTS]**

$$\log \frac{p^2 n}{m^3}$$

[12] Draw the graph of the fuction $f(x) = 2 \cdot 3^{x-2} - 5$. Show the functions values of at least 4 points on your graph. **[10 POINTS]** LABEL ALL ASYMPTOTES CLEARLY.

x				
$f(x)$				



ASYMPTOTE $y = -5$ $\longrightarrow$