Math 114
Midterm 3
Wed Jun 9, 2010

Name: _____

SCORE: _____ / 101 POINTS

NO CALCULATORS ALLOWED

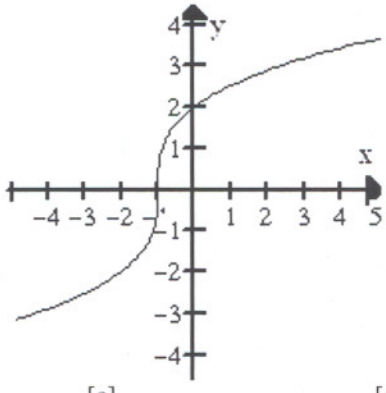
➡➡➡➡ PUT A BOX AROUND EACH FINAL ANSWER ⬅⬅⬅⬅

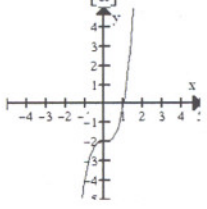
Fill in the blanks. Write "**UNDEFINED**" if the value does not exist. **[NO NEED TO SHOW WORK]** **SCORE:** ___ / 21 POINTS

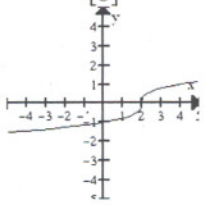
$7^{\log_7(-3)} =$ UNDEFINED $\log_5 5^{-2} =$ -2 $\log_6 1 =$ 0 $6^{\log_6 5} =$ 5

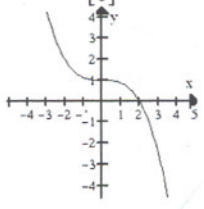
$\log_7 0 =$ UNDEFINED $\log_2 32 =$ 5 $\log 100{,}000 =$ 5

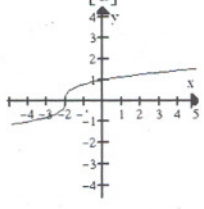
Circle the graph of the inverse of the following function. **SCORE:** ___ / 6 POINTS

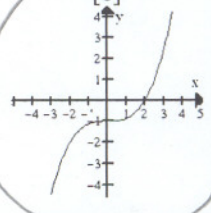


[a]


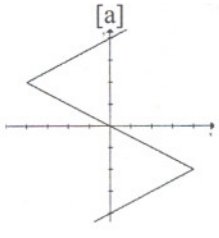
[b]


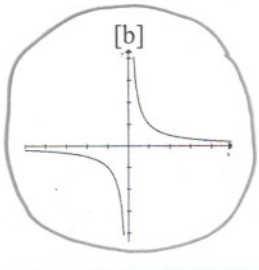
[c]


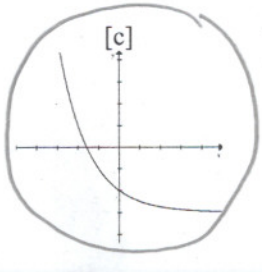
[d]


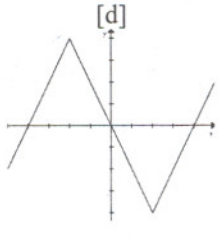
[e]


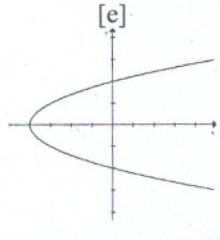
Circle the **two** graphs below which represent one-to-one functions. **SCORE:** ___ / 6 POINTS

[a]


[b]


[c]


[d]


[e]


Circle the range of $f(x) = \log_7 x$. **SCORE:** ___ / 3 POINTS

[a] $\{x \neq 7\}$ [b] **R** [c] $\{x \neq 0\}$ [d] $\{x > 0\}$ [e] $\{x > 7\}$

Circle the domain of $f(x) = \log_5 x$. **SCORE:** ___ / 3 POINTS

[a] $\{x \neq 5\}$ [b] **R** [c] $\{x \neq 0\}$ [d] $\{x > 0\}$ [e] $\{x > 5\}$

Find the equation of the asymptote of $f(x) = 7\log_4(x+3)$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$$x+3=0$$
$$x=-3$$

Find the range of the function $f(x) = 4-\sqrt{5-x}$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$$\sqrt{5-x} \geq 0$$
$$-\sqrt{5-x} \leq 0$$
$$4-\sqrt{5-x} \leq 4$$
$$\{y \leq 4\}$$

Find the domain of the function $f(x) = 7+\frac{5}{3x-6}$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$$3x-6 \neq 0$$
$$\{x \neq 2\}$$

Find the inverse of the function $f(x) = 7-\sqrt{2-x}$. **SHOW PROPER WORK.** **SCORE: ___ / 10 POINTS**

$$y = 7-\sqrt{2-x}$$
$$x = 7-\sqrt{2-y}$$
$$x-7 = -\sqrt{2-y}$$
$$(x-7)^2 = 2-y$$
$$(x-7)^2-2 = -y$$
$$y = 2-(x-7)^2$$
$$f^{-1}(x) = 2-(x-7)^2$$

Write $\log 42 - \log 7 + \log 3$ as the logarithm of a single quantity. **Simplify your answer.** **SCORE: ___ / 6 POINTS**

$\log \frac{42}{7} \cdot 3$

$= \log 18$

Write $\log \frac{z}{w^3 y^2}$ as the sums and/or differences and/or multiples of logarithms of single variables. **SCORE: ___ / 6 POINTS**

$\log z - 3\log w - 2\log y$

Solve for x: $4^{2x+11} = 8^{x+6}$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 10 POINTS**

$2^{2(2x+11)} = 2^{3(x+6)}$

$2(2x+11) = 3(x+6)$

$4x + 22 = 3x + 18$

$x = -4$

CHECK:

$4^{2(-4)+11} = 4^3 = 64$

$8^{-4+6} = 8^2 = 64$

Solve for x: $\log_2(x^2 - 9) - \log_2(x - 2) = 3$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 12 POINTS**

$\log_2 \frac{x^2-9}{x-2} = 3$

$\frac{x^2-9}{x-2} = 2^3 = 8$

$x^2 - 9 = 8(x-2)$

$x^2 - 9 = 8x - 16$

$x^2 - 8x + 7 = 0$

$(x-1)(x-7) = 0$

$x = 1, 7$

CHECK:

$x = 1$ $\log_2(-8)$ UNDEFINED

$\boxed{x = 7}$ $\log_2 40 - \log_2 5$

$= \log_2 \frac{40}{5}$

$= \log_2 8$

$= 3$