Math 114
Midterm 3
Wed Jun 9, 2010

Name: _____

SCORE: _____ / 101 POINTS

NO CALCULATORS ALLOWED

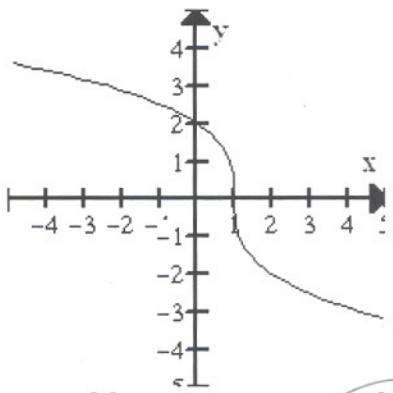
➡➡➡➡ PUT A BOX AROUND EACH FINAL ANSWER ⬅⬅⬅⬅

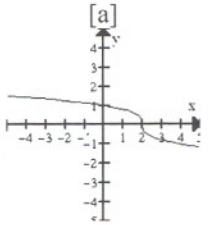
Fill in the blanks. Write "**UNDEFINED**" if the value does not exist. **[NO NEED TO SHOW WORK]** **SCORE:** ___ / 21 POINTS

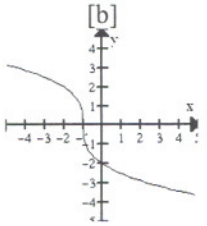
$7^{\log_7 3} =$ 3 $\log_5(-25) =$ UNDEFINED $\log_2 2^{-5} =$ −5 $6^{\log_6 0} =$ UNDEFINED

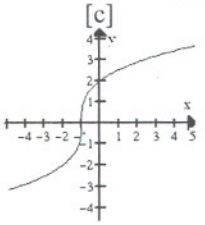
$\log_3 1 =$ 0 $\log_3 81 =$ 4 $\log 1{,}000{,}000 =$ 6

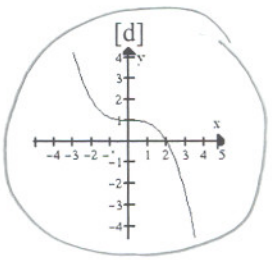
Circle the graph of the inverse of the following function. **SCORE:** ___ / 6 POINTS

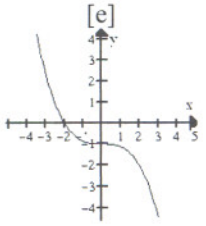


[a]


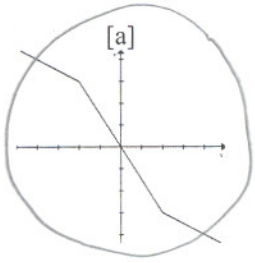
[b]


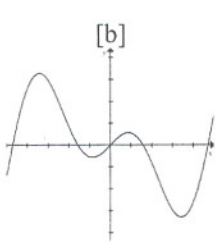
[c]


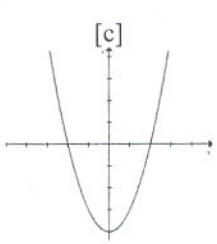
[d]


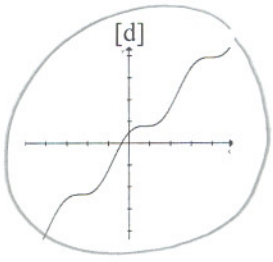
[e]


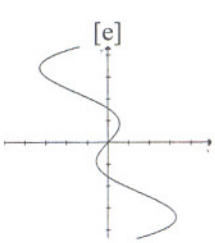
Circle the **two** graphs below which represent one-to-one functions. **SCORE:** ___ / 6 POINTS

[a]


[b]


[c]


[d]


[e]


Circle the domain 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 range 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 inverse of the function $f(x) = 4 - \sqrt{5-x}$. **SHOW PROPER WORK.** **SCORE: ___ / 10 POINTS**

$$y = 4 - \sqrt{5-x}$$
$$x = 4 - \sqrt{5-y}$$
$$x - 4 = -\sqrt{5-y}$$
$$(x-4)^2 = 5 - y$$
$$(x-4)^2 - 5 = -y$$

$$y = 5 - (x-4)^2$$
$$f^{-1}(x) = 5 - (x-4)^2$$

Find the domain of the function $f(x) = 5 - \dfrac{7}{2x+8}$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$$2x + 8 \neq 0$$
$$\{x \neq -4\}$$

Find the range of the function $f(x) = 7 - \sqrt{2-x}$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$$\sqrt{2-x} \geq 0$$
$$-\sqrt{2-x} \leq 0$$
$$7 - \sqrt{2-x} \leq 7$$
$$\{y \leq 7\}$$

Find the equation of the asymptote of $f(x) = 6\log_2(x-5)$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$$x - 5 = 0$$
$$x = 5$$

Write $\log 60 - \log 5 + \log 2$ as the logarithm of a single quantity. **Simplify your answer.** **SCORE: ___ / 6 POINTS**

$\log \frac{60}{5} \cdot 2$

$= \log 24$

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

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

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

$2^{3(2x+8)} = 2^{2(x+6)}$

$3(2x+8) = 2(x+6)$

$6x+24 = 2x+12$

$4x = -12$

$x = -3$

CHECK:

$8^{2(-3)+8} = 8^2 = 64$

$4^{-3+6} = 4^3 = 64$ ✓

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

$\log_2 \frac{x^2-12}{x-3} = 3$

$\frac{x^2-12}{x-3} = 2^3 = 8$

$x^2-12 = 8(x-3)$

$x^2-12 = 8x-24$

$x^2-8x+12 = 0$

$(x-2)(x-6) = 0$

$x = 2, 6$

CHECK:

$x=2$ ~~$\log_2(-8)$~~ UNDEFINED

$\boxed{x=6}$ $\log_2 24 - \log_2 3$

$= \log_2 \frac{24}{3}$

$= \log_2 8$

$= 3$