Math 114
Midterm 3
Thu Mar 11, 2010

Name: _____

SCORE: _____ / 101 POINTS

NO CALCULATORS ALLOWED

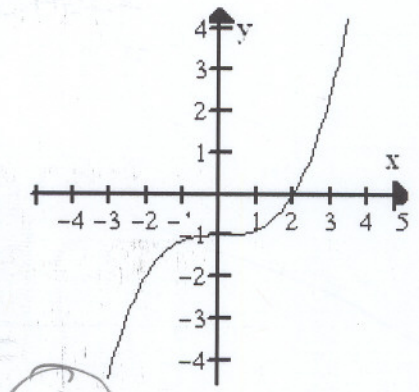
PUT A BOX AROUND EACH FINAL ANSWER

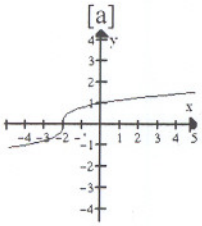
Fill in the blanks. Write "**UNDEFINED**" if the value does not exist. **[NO NEED TO SHOW WORK]** SCORE: ___ / 21 POINTS

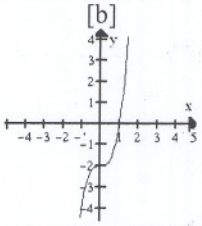
$9^{\log_9 7} =$ 7 $\quad \log_4(-16) =$ UNDEF $\quad \log_6 6^{-3} =$ -3 $\quad 8^{\log_8 0} =$ UNDEF

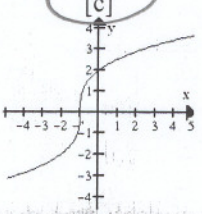
$\log 10{,}000 =$ 4 $\quad \log_7 1 =$ 0 $\quad \log_2 64 =$ 6

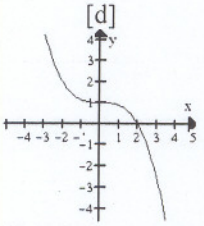
Circle the graph of the inverse of the following function. SCORE: ___ / 6 POINTS

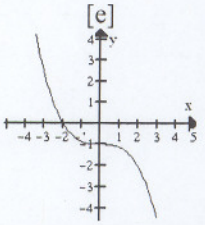


[a] 

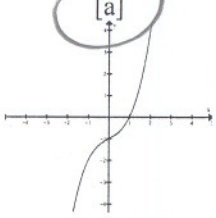
[b] 

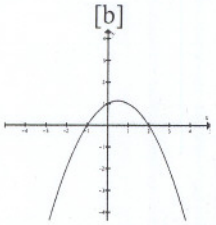
[c] 

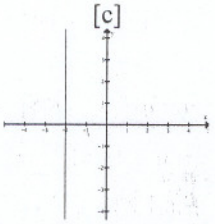
[d] 

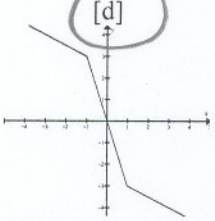
[e] 

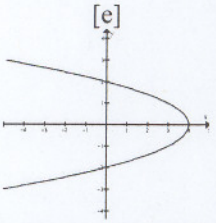
Circle the **two** graphs below which represent one-to-one functions. SCORE: ___ / 6 POINTS

[a] 

[b] 

[c] 

[d] 

[e] 

Circle the 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 inverse of the function $f(x) = 2 - \sqrt{6+x}$. **SHOW PROPER WORK.** **SCORE: ___ / 10 POINTS**

$y = 2 - \sqrt{6+x}$

$x = 2 - \sqrt{6+y}$

$x - 2 = -\sqrt{6+y}$

$(x-2)^2 = 6+y$

$y = (x-2)^2 - 6$

$f^{-1}(x) = (x-2)^2 - 6$ or $(2-x)^2 - 6$

Find the domain of the function $f(x) = 7 - \dfrac{4}{3x+6}$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$3x + 6 \neq 0$

$\{x \neq -2\}$

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

$\sqrt{x+5} \geq 0$

$-\sqrt{x+5} \leq 0$

$f(x) = 3 - \sqrt{x+5} \leq 3$

$\{y \leq 3\}$

Find the equation of the asymptote of $f(x) = 4\log_7(x-3)$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$x - 3 = 0$

$x = 3$

Write $\log 24 - \log 3 + \log 4$ as the logarithm of a single quantity. **Simplify your answer.** **SCORE: ___ / 6 POINTS**

$\log \frac{24}{3} + \log 4 = \log 8 + \log 4 = \log(8 \cdot 4)$

$= \boxed{\log 32}$

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

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

Solve for x: $8^{x-3} = 4^{8-x}$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 10 POINTS**

$2^{3(x-3)} = 2^{2(8-x)}$

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

$3x - 9 = 16 - 2x$

$5x = 25$

$\boxed{x = 5}$

CHECK:

$8^{5-3} = 8^2 = 64$

$4^{8-5} = 4^3 = 64$ ✓

Solve for x: $\log_2(x^2 - 12) - \log_2(1 - x) = 3$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 12 POINTS**

$\log_2 \frac{x^2-12}{1-x} = 3$

$\frac{x^2-12}{1-x} = 2^3 = 8$

$x^2 - 12 = 8(1-x)$

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

$x^2 + 8x - 20 = 0$

$(x+10)(x-2) = 0$

$x = -10, 2$

CHECK:

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

$\boxed{x = -10}$: $\log_2 88 - \log_2 11$.

$= \log_2 \frac{88}{11}$

$= \log_2 8$

$= 3$ ✓