Math 114 (8:30am – 9:20am)
Midterm 3B Part 1
Wed Nov 24, 2010

Name: _____

SCORE: _____ / 101 POINTS

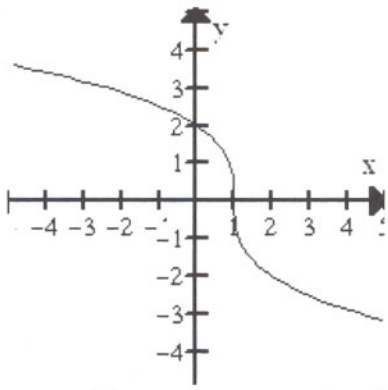
NO CALCULATORS ALLOWED

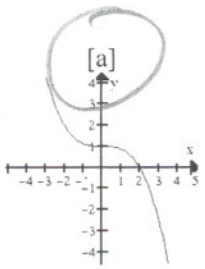
Fill in the blanks. Write "**UNDEFINED**" if the value does not exist. **[NO NEED TO SHOW WORK]** **SCORE: ___ / 21 POINTS**

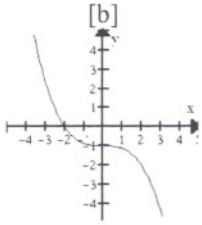
$\log_3 0 =$ UNDEFINED $\quad \log_2 64 =$ 6 $\quad 4^{\log_4 3} =$ 3 $\quad \log_9 9^{-3} =$ −3

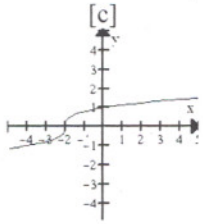
$\log_8 1 =$ 0 $\quad 2^{\log_2(-8)} =$ UNDEFINED $\quad \log 10{,}000 =$ 4

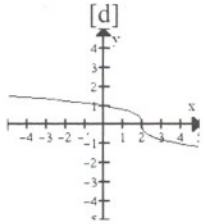
Circle the graph of the inverse of the following function. **SCORE: ___ / 6 POINTS**

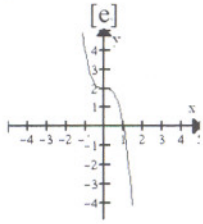


[a] 

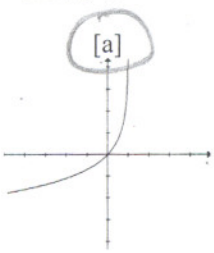
[b] 

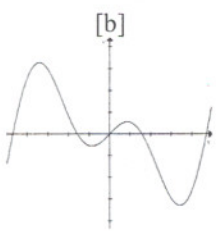
[c] 

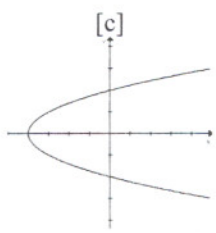
[d] 

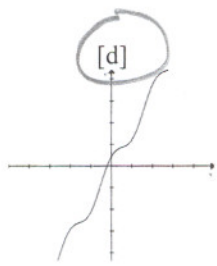
[e] 

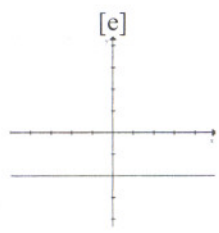
Circle the **two** graphs below which represent one-to-one functions. **SCORE: ___ / 6 POINTS**

[a] 

[b] 

[c] 

[d] 

[e] 

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

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

Circle the asymptote of $f(x) = 5^x$. **SCORE: ___ / 3 POINTS**

[a] $x = 0$ [b] $y = 1$ [c] $y = 0$ [d] $x = 5$ [e] $y = 5$

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

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

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

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

$-\sqrt{5+x}+2 \leq 0+2$

$\boxed{\{y \leq 2\}}$

Find the equation of the asymptote of $f(x) = 8\log_3(x+6)$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$x+6=0$

$\boxed{x=-6}$

Find the inverse of the function $f(x) = 3 - \sqrt{6-x}$. **SHOW PROPER WORK.** **SCORE: ___ / 10 POINTS**

$y = 3 - \sqrt{6-x}$

$x = 3 - \sqrt{6-y}$

$x-3 = -\sqrt{6-y}$

$(x-3)^2 = (-\sqrt{6-y})^2$

$(x-3)^2 = 6-y$

$(x-3)^2 - 6 = -y$

$\boxed{y = 6-(x-3)^2}$

Find the domain of the function $f(x) = \dfrac{5}{4x+8} + 9$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$4x+8 \neq 0$

$4x \neq -8$

$\boxed{\{x \neq -2\}}$

Write $\log 60 - \log 3 + \log 4$ as the logarithm of a single quantity. **Simplify your answer.** **SCORE: ___ / 6 POINTS**

$\log \frac{60}{3} + \log 4$

$= \log\left(\frac{60}{3} \cdot 4\right) = \boxed{\log 80}$

Write $\log \frac{w^4}{zy^5}$ as the sums and/or differences and/or multiples of logarithms of single variables. **SCORE: ___ / 6 POINTS**

$\log w^4 - \log zy^5$

$= \log w^4 - (\log z + \log y^5)$

$= 4\log w - (\log z + 5\log y) = \boxed{4\log w - \log z - 5\log y}$

Solve for x: $8^{x+7} = 4^{-x-2}$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 10 POINTS**

$(2^3)^{x+7} = (2^2)^{-x-2}$

$2^{3(x+7)} = 2^{2(-x-2)}$

$3(x+7) = 2(-x-2)$

$3x + 21 = -2x - 4$

$5x = -25$

$\boxed{x = -5}$

CHECK:

$8^{-5+7} = 8^2 = 64$

$4^{-(-5)-2} = 4^3 = 64$ ✓

Solve for x: $\log_3(x^2 - 22) - \log_3(x - 4) = 2$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 12 POINTS**

$\log_3 \frac{x^2-22}{x-4} = 2$

$3^{\log_3 \frac{x^2-22}{x-4}} = 3^2$

$\frac{x^2-22}{x-4} = 9$

$x^2 - 22 = 9(x-4)$

$x^2 - 22 = 9x - 36$

$x^2 - 9x + 14 = 0$

$(x-2)(x-7) = 0$

$x = 2, 7$

CHECK:

$x = 2$ $\log_3(-18)$ UNDEFINED ✗

$\boxed{x = 7}$ $\log_3 27 - \log_3 3 = 3 - 1 = 2$ ✓