Math 114 (9:30am – 10:20am)
Midterm 3C Part 1
Wed Nov 24, 2010

Name: _____

SCORE: _____ / 101 POINTS

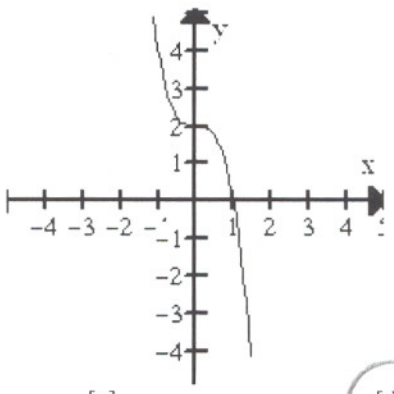
NO CALCULATORS ALLOWED

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

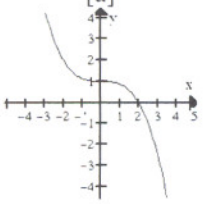
$2^{\log_2 0} =$ UNDEFINED $\quad \log_2 32 =$ 5 $\quad \log_9 9^0 =$ 0 $\quad \log_{13} 1 =$ 0

$\log_3 -9 =$ UNDEFINED $\quad 3^{\log_3 4} =$ 4 $\quad \log 100{,}000 =$ 5

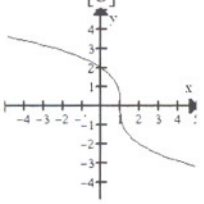
Circle the graph of the inverse of the following function. SCORE: ___ / 6 POINTS



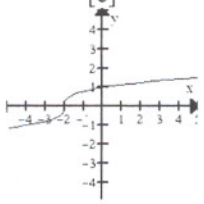
[a]



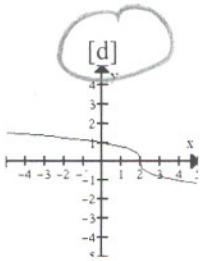
[b]



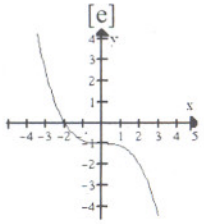
[c]



[d]

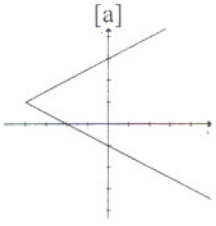


[e]

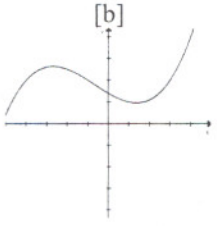


Circle the **two** graphs below which represent one-to-one functions. SCORE: ___ / 6 POINTS

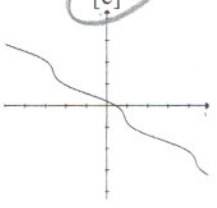
[a]



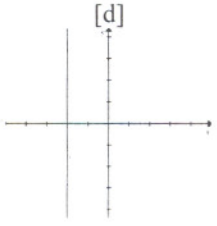
[b]



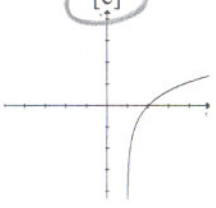
[c]



[d]



[e]



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

[a] $y = 3$ [b] $x = 0$ [c] $x = 3$ [d] $y = 1$ [e] $y = 0$

Circle the domain of $f(x) = \log_2 x$. SCORE: ___ / 3 POINTS

[a] $\{x \neq 2\}$ [b] **R** [c] $\{x \neq 0\}$ [d] $\{x > 0\}$ [e] $\{x > 2\}$

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

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

$\sqrt{6-x} \geq 0$

$-\sqrt{6-x} \leq 0$

$-\sqrt{6-x}+3 \leq 0+3$

$\boxed{\{y \leq 3\}}$

Find the equation of the asymptote of $f(x) = 6\log_8(x+3)$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$x+3=0$

$\boxed{x=-3}$

Find the inverse of the function $f(x) = 2 - \sqrt{5+x}$. **SHOW PROPER WORK.** **SCORE: ___ / 10 POINTS**

$y = 2-\sqrt{5+x}$

$x = 2-\sqrt{5+y}$

$x-2 = -\sqrt{5+y}$

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

$(x-2)^2 = 5+y$

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

Find the domain of the function $f(x) = \dfrac{7}{3x+12} + 5$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$3x+12 \neq 0$

$3x \neq -12$

$\boxed{\{x \neq -4\}}$

Solve for x: $8^{x+6} = 4^{-x-1}$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 10 POINTS**

$(2^3)^{x+6} = (2^2)^{-x-1}$

$2^{3(x+6)} = 2^{2(-x-1)}$

$3(x+6) = 2(-x-1)$

$3x+18 = -2x-2$

$5x = -20$

$\boxed{x = -4}$

CHECK:

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

$4^{-(-4)-1} = 4^3 = 64$ ✓

Write $\log 54 - \log 9 + \log 3$ as the logarithm of a single quantity. **Simplify your answer.** **SCORE: ___ / 6 POINTS**

$\log \frac{54}{9} + \log 3$

$= \log\left(\frac{54}{9} \cdot 3\right)$

$= \log 18$

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

$\log y^5 - \log wz^4$

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

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

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 X

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