Math 114 (8:30am – 9:20am)
Midterm 3 Part 1 Version S
Thu Dec 1, 2011

Name: _____

SCORE: _____ / 105 POINTS

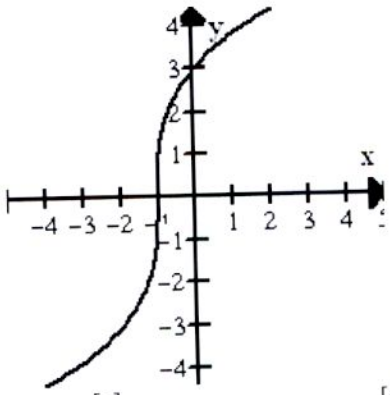
**NO CALCULATORS ALLOWED**

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

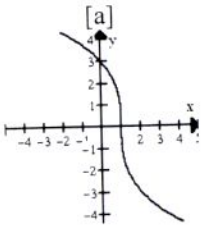
$4^{\log_4(-16)} =$ UNDEFINED $\quad 9^{\log_9 7} =$ 7 $\quad \log_2 64 =$ 6 $\quad \log 10{,}000 =$ 4

$\log_6 6^0 =$ 0 $\quad \log_8 0 =$ UNDEFINED $\quad \log_{12} 1 =$ 0

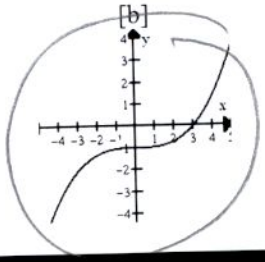
Circle the graph of the inverse of the following function. SCORE: ___ / 6 POINTS



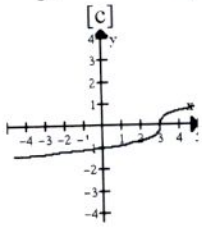

[a]



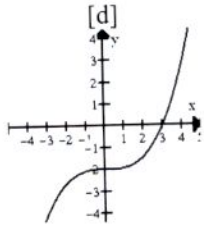
[b]



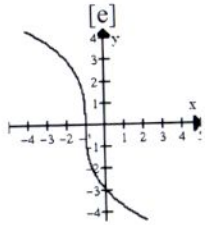
[c]



[d]

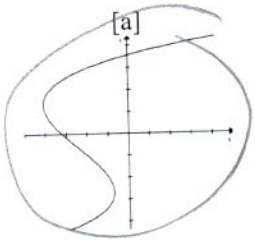


[e]

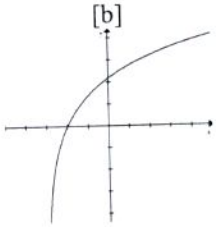


Circle the **two** graphs below which **DO NOT** represent one-to-one functions. SCORE: ___ / 6 POINTS

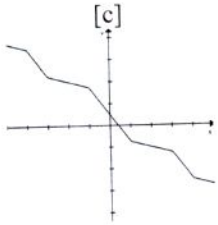
[a]



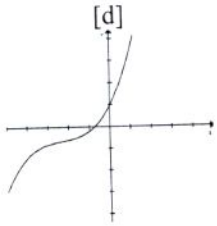
[b]



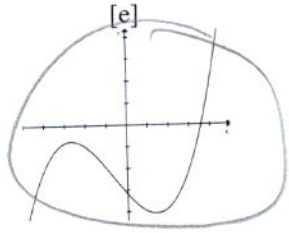
[c]



[d]



[e]



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

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

Circle the asymptote of $f(x) = 4^x$. SCORE: ___ / 3 POINTS

[a] $y = 4$ [b] $x = 0$ [c] $x = 4$ [d] $y = 1$ [e] $y = 0$

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

Find the equation of the asymptote of $f(x) = 7\log_5(4x+12)$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$4x+12=0$

$\boxed{x=-3}$

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Find the domain of the function $f(x) = \frac{9}{2x+10}+3$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$2x+10\neq 0$

$\boxed{\{x\neq -5\}}$

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Write $\log\frac{m^8}{bt^3}$ as the sums and/or differences and/or multiples of logarithms of single variables. **SCORE: ___ / 6 POINTS**

$8\log m - \log b - 3\log t$

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Write $\log 60 - \log 5 + \log 3$ as the logarithm of a single quantity. **Simplify your answer.** **SCORE: ___ / 6 POINTS**

$= \log\frac{60}{5} + \log 3$

$= \log 12 + \log 3$

$= \log(12\cdot 3) = \boxed{\log 36}$

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Solve for $x$: $4^{x+3} = 8^{2x+10}$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 9 POINTS**

$(2^2)^{x+3} = (2^3)^{2x+10}$

$2^{2(x+3)} = 2^{3(2x+10)}$

$2(x+3) = 3(2x+10)$

$2x+6 = 6x+30$

$-4x = 24$

$\boxed{x=-6}$

CHECK:

$4^{-6+3} = 4^{-3} = \frac{1}{64}$

$8^{2(-6)+10} = 8^{-2} = \frac{1}{64}$ ✓

Find the range of the function $f(x) = 9 - \sqrt{2+x}$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$\sqrt{2+x} \geq 0$

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

$9 - \sqrt{2+x} \leq 9$

$\boxed{\{y \leq 9\}}$

Find the inverse of the function $f(x) = 8 - \sqrt{5-x}$. **SHOW PROPER WORK.** **SCORE: ___ / 9 POINTS**

$y = 8 - \sqrt{5-x}$

$x = 8 - \sqrt{5-y}$

$x - 8 = -\sqrt{5-y}$

$8 - x = \sqrt{5-y}$

$(8-x)^2 = 5-y$

$(8-x)^2 - 5 = -y$

$5 - (8-x)^2 = y$

$\boxed{f^{-1}(x) = 5 - (8-x)^2}$

Solve for $x$: $3 + 2\log_3(8x+1) = 11$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 9 POINTS**

$2\log_3(8x+1) = 8$

$\log_3(8x+1) = 4$

$3^4 = 8x+1$

$81 = 8x+1$

$80 = 8x$

$\boxed{x = 10}$

CHECK: $3 + 2\log_3(8(10)+1)$

$= 3 + 2\log_3 81$

$= 3 + 2(4)$

$= 3 + 8$

$= 11$ ✓

Solve for $x$: $\log_2(14-x) - \log_2(3x+8) = 3$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 9 POINTS**

$\log_2 \frac{14-x}{3x+8} = 3$

$2^3 = \frac{14-x}{3x+8}$

$8 = \frac{14-x}{3x+8}$

$8(3x+8) = 14-x$

$24x + 64 = 14 - x$

$25x = -50$

$\boxed{x = -2}$

CHECK:

$\log_2 16 - \log_2 2$

$= 4 - 1$

$= 3$ ✓