Math 114 (8:30am – 9:20am)
Midterm 3 Part 1 Version S
Tue Jun 7, 2011

Name: _____

SCORE: _____ / 105 POINTS

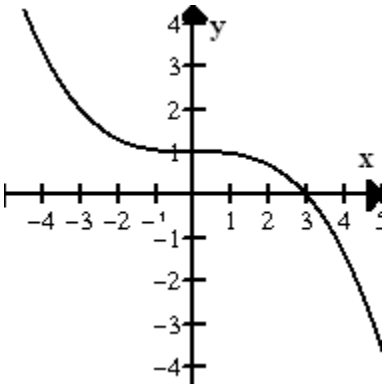
NO CALCULATORS ALLOWED

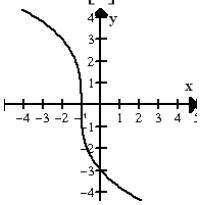
Fill in the blanks. Write "**UNDEFINED**" if the value does not exist. **[NO NEED TO SHOW WORK]** **SCORE: ___ / 21 POINTS**

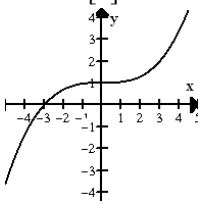
$2^{\log_2 0} =$ UNDEFINED $\quad \log_5 5^{-4} = -4 \quad \log_3 81 = 4 \quad \log_6 1 = 0$

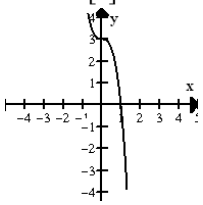
$7^{\log_7 11} = 11 \quad \log_3(-9) =$ UNDEFINED $\quad \log 100{,}000 = 5$

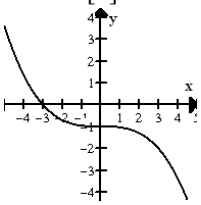
Circle the graph of the inverse of the following function. **SCORE: ___ / 6 POINTS**

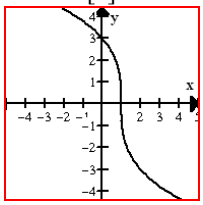


[a]


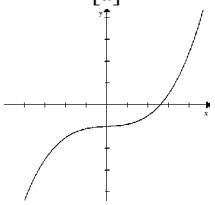
[b]


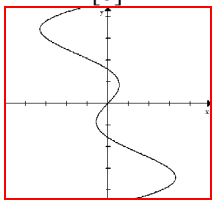
[c]


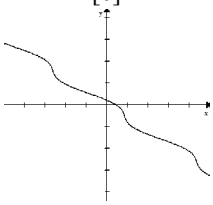
[d]


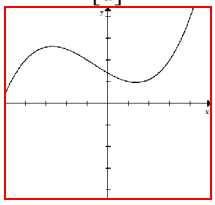
[e]


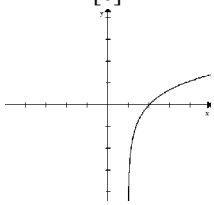
Circle the **two** graphs below which **DO NOT** represent one-to-one functions. **SCORE: ___ / 6 POINTS**

[a]


[b]


[c]


[d]


[e]


Circle the domain of $f(x) = \log_7 x$. **SCORE: ___ / 3 POINTS**

[a] $\{x \neq 7\}$ [b] $\{x > 0\}$ [c] $\{x \neq 0\}$ [d] **R** [e] $\{x > 7\}$

Circle the asymptote of $f(x) = 8^x$. **SCORE: ___ / 3 POINTS**

[a] $x = 0$ [b] $y = 0$ [c] $x = 8$ [d] $y = 8$ [e] $y = 1$

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

Find the equation of the asymptote of $f(x)=4\log_2(3x+15)$. **SHOW PROPER WORK.** **SCORE: ___ / 6 POINTS**

$3x+15=0$

$\boxed{x=-5}$

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

$2x+6\neq 0$

$\boxed{x\neq -3}$

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

$\log z^4-\log yx^5$

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

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

$=\boxed{4\log z-\log y-5\log x}$

Write $\log 48-\log 6+\log 4$ as the logarithm of a single quantity. **Simplify your answer.** **SCORE: ___ / 6 POINTS**

$\log\frac{48}{6}+\log 4$

$=\log 8+\log 4$

$=\log(8\times 4)$

$=\boxed{\log 32}$

Solve for x: $8^{x+3}=4^{2x+7}$. **SHOW PROPER WORK. CHECK YOUR ANSWER(S).** **SCORE: ___ / 9 POINTS**

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

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

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

$3x+9=4x+14$

$\boxed{x=-5}$

CHECK: $8^{-5+3}=8^{-2}=\frac{1}{64}$

$4^{2(-5)+7}=4^{-3}=\frac{1}{64}$

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

$y = 9 - \sqrt{2-x}$
$x = 9 - \sqrt{2-y}$
$x - 9 = -\sqrt{2-y}$
$(x-9)^2 = (-\sqrt{2-y})^2$
$(x-9)^2 = 2 - y$
$y + (x-9)^2 = 2$
$y = 2 - (x-9)^2$
$\boxed{f^{-1}(x) = 2 - (x-9)^2}$

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

$\sqrt{7-x} \geq 0$
$-\sqrt{7-x} \leq 0$
$4 - \sqrt{7-x} \leq 4$
$\boxed{y \leq 4}$

Solve for x: $2 + 3\log_6(5x+1) = 8$. **SHOW PROPER WORK.** **CHECK YOUR ANSWER(S).** **SCORE: ___ / 9 POINTS**

$3\log_6(5x+1) = 6$
$\log_6(5x+1) = 2$
$6^{\log_6(5x+1)} = 6^2$
$5x+1 = 36$
$5x = 35$
$\boxed{x = 7}$

CHECK:

$2 + 3\log_6(5(7)+1)$
$= 2 + 3\log_6(35+1)$
$= 2 + 3\log_6 36$
$= 2 + 3(2)$
$= 2 + 6$
$= 8$

Solve for x: $\log_2(17-5x) - \log_2(x+7) = 3$. **SHOW PROPER WORK.** **CHECK YOUR ANSWER(S).** **SCORE: ___ / 9 POINTS**

$\log_2 \frac{17-5x}{x+7} = 3$
$2^{\log_2 \frac{17-5x}{x+7}} = 2^3$
$\frac{17-5x}{x+7} = 8$
$17 - 5x = 8(x+7)$
$17 - 5x = 8x + 56$
$-13x = 39$
$\boxed{x = -3}$

CHECK:

$\log_2(17 - 5(-3)) - \log_2(-3+7)$
$= \log_2(17+15) - \log_2 4$
$= \log_2 32 - \log_2 4$
$= 5 - 2$
$= 3$