Math 114
Midterm 3 Part 1
Wed Mar 11, 2009

Name: _____

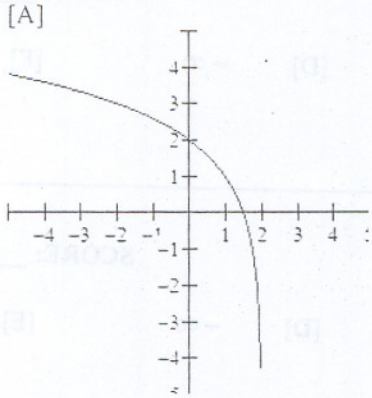
NO CALCULATORS ALLOWED

[1] **WRITE THE LETTER OF THE CORRECT ANSWER IN THE SPACE PROVIDED**
DO *NOT* CIRCLE THE ANSWERS

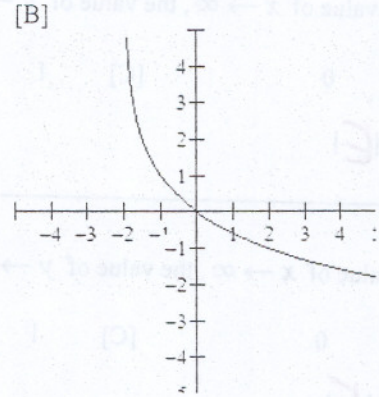
The graph of $f(x) = \log_2(-(x-2))+1$ is

SCORE: ___ / 6 POINTS

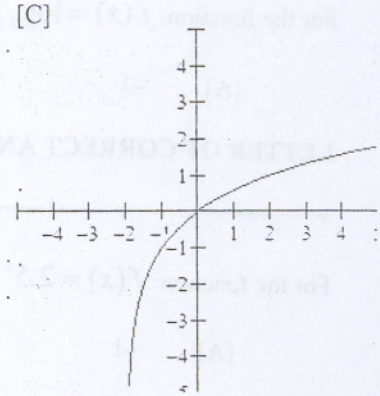
[A]



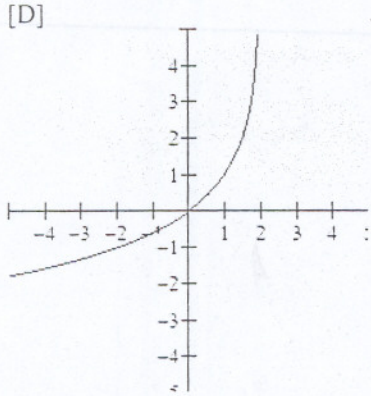
[B]



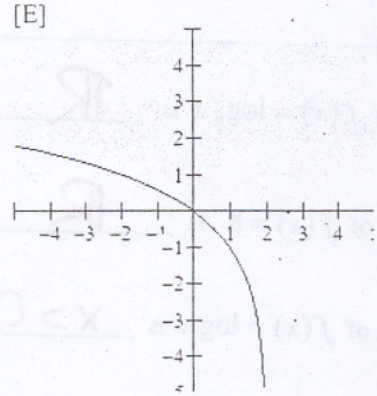
[C]



[D]



[E]



LETTER OF CORRECT ANSWER: [A]

For the function $f(x) = \left(\frac{2}{5}\right)^x$, as the value of $x \to \infty$, the value of $y \to$

SCORE: ___ / 3 POINTS

[A] -1 [B] 0 [C] 1 [D] $-\infty$ [E] ∞

LETTER OF CORRECT ANSWER: [B]

The graph of $f(x) = -5^{x-2} + 4$ has an asymptote at

SCORE: ___ / 3 POINTS

[A] $y = 4$ [B] $y = 2$ [C] $x = -4$ [D] $x = 4$ [E] $x = -2$

LETTER OF CORRECT ANSWER: [A]

For the function $f(x) = \log_7 x$, as the value of $x \to 0$, the value of $y \to$ SCORE: ___ / 3 POINTS

[A] -1 [B] 0 [C] 1 [D] $-\infty$ [E] ∞

LETTER OF CORRECT ANSWER: [D]

The graph of $f(x) = -\log_4(x-3)+6$ has an asymptote at SCORE: ___ / 3 POINTS

[A] $y=-3$ [B] $y=6$ [C] $x=6$ [D] $x=-6$ [E] $x=3$

LETTER OF CORRECT ANSWER: [E]

For the function $f(x) = \log_3 x$, as the value of $x \to \infty$, the value of $y \to$ SCORE: ___ / 3 POINTS

[A] -1 [B] 0 [C] 1 [D] $-\infty$ [E] ∞

LETTER OF CORRECT ANSWER: [E]

For the function $f(x) = 2.5^x$, as the value of $x \to \infty$, the value of $y \to$ SCORE: ___ / 3 POINTS

[A] -1 [B] 0 [C] 1 [D] $-\infty$ [E] ∞

LETTER OF CORRECT ANSWER: [E]

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[2] [a] The range of $f(x) = \log_9 x$ is $\mathbb{R}$. SCORE: ___ / 3 POINTS

[b] The domain of $f(x) = 8^x$ is $\mathbb{R}$. SCORE: ___ / 3 POINTS

[c] The domain of $f(x) = \log x$ is $x > 0$. SCORE: ___ / 3 POINTS

[d] The range of $f(x) = 9^x$ is $y > 0$. SCORE: ___ / 3 POINTS

[3] Evaluate the following. Write "UNDEFINED" if the value does not exist. SCORE: ___ / 30 POINTS

[a] $\log_7 7^6 =$ 6

[b] $6^{\log_6 0} =$ UNDEFINED

[c] $\log_5(-25) =$ UNDEFINED

[d] $\log_9 1 =$ 0

[e] $\log_4 64 =$ 3

[f] $\log 10000 =$ 4

[g] $\log_3 3^{-4} =$ -4

[h] $10^{\log 8} =$ 8

[i] $\log_{16} 4 =$ $\frac{1}{2}$

[j] $\log_3 \frac{1}{9} =$ -2

YOU MUST SHOW LOGICAL, NEAT AND ORGANIZED WORK TO EARN FULL CREDIT

PUT A BOX AROUND YOUR FINAL ANSWER

[4] Write $\log y - 3\log z + 2\log x$ as the logarithm of a single expression. **SCORE: ___ / 5 POINTS**

$$\log \frac{yx^2}{z^3}$$

[5] Write $\log \frac{y^3}{\sqrt[4]{zx}}$ as the sums / differences / multiples of logarithms of numbers or single variables. **SCORE: ___ / 5 POINTS**

$$3\log y - \frac{1}{4}\log z - \frac{1}{4}\log x$$

[6] Find the exact solutions of the following equations algebraically. **Check your answers.** **SCORE: ___ / 18 POINTS**

[a] $8^{2x+6} = 4^{1-x}$

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

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

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

$$6x+18 = 2-2x$$

$$8x = -16$$

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

CHECK:

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

$$4^{1-(-2)} = 4^3 = 64 \checkmark$$

[b] $\log_2(x^2-9) - \log_2(x-2) = 3$

$$\log_2 \frac{x^2-9}{x-2} = 3$$

$$\frac{x^2-9}{x-2} = 2^3 = 8$$

$$x^2-9 = 8x-16$$

$$x^2-8x+7 = 0$$

$$(x-1)(x-7) = 0$$

$x = 1$ OR $\boxed{7}$

CHECK:

$x=1$: $\log_2(-8)$ UNDEFINED

NOT A SOLUTION

$x=7$: $\log_2 40 - \log_2 5$

$= \log_2 8$

$= 3 \checkmark$

TO BE CONTINUED DURING THE FIRST 15 MINUTES OF LAB TOMORROW