Math 114
Midterm 3
Fri Jun 13, 2008

ALL COLORS
SAME QUESTIONS
DIFFERENT ORDER

Name: _____

[1] [a] If $f(x) = 2 - 3\sqrt{5-x}$, find $f(-4)$.

$f(-4) = 2 - 3\sqrt{5-(-4)}$
$= 2 - 3\sqrt{9}$
$= 2 - 3(3)$
$= 2 - 9$
$= -1$

[b] If $f(x) = 2x^2 - 3x - 5$, find $f(-2)$. **[6 POINTS]**

$f(-2) = 2(-2)^2 - 3(-2) - 5$
$= 2(4) + 6 - 5$
$= 8 + 6 - 5$
$= 9$

[2] Find the domains of the following functions. **[12 POINTS]**

[a] $f(x) = \log_5 x$

$\{x > 0\}$

[b] $f(x) = 3 - \dfrac{1}{2x+5}$

$2x + 5 \neq 0$
$2x \neq 5$
$x \neq -\frac{5}{2}$
$\{x \neq -\frac{5}{2}\}$

[c] $f(x) = 7 - \sqrt{6-x}$

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

[3] Find the ranges of the following functions. **[10 POINTS]**

[a] $f(x) = 5^x$

$\{y > 0\}$

[b] $f(x) = 7 - \sqrt{6-x}$

$\sqrt{6-x} > 0$
$-\sqrt{6-x} < 0$
$7 - \sqrt{6-x} < 7$
$\{y < 7\}$

QUESTIONS ON OTHER SIDE

[4] Evaluate the following. Write "UNDEFINED" if the value does not exist. **[20 POINTS]**

[a] $10^{\log 3} =$ 3

[b] $8^{\log_8 0} =$ UNDEFINED

[c] $\log_7 1 =$ 0

[d] $\log_4(-8) =$ UNDEFINED

[e] $\log_4 4^{-3} =$ -3

[f] $\log_6 6^7 =$ 7

[g] $\log 100{,}000 =$ 5

[h] $\log_3 81 =$ 4

[i] $\log_2 \frac{1}{8} =$ -3

[j] $\log_9 3 =$ $\frac{1}{2}$

[5] Find the exact solutions of the following equations. **Check your answers.** **[20 POINTS]**

[a] $\log_3(4x-2) - \log_3(7-x) = 2$

$\log_3 \frac{4x-2}{7-x} = 2$

$\frac{4x-2}{7-x} = 3^2$

$\frac{4x-2}{7-x} = 9$

$4x-2 = 9(7-x)$

$4x-2 = 63-9x$

$13x = 65$

$x = 5$

CHECK:

$\log_3(18) - \log_3(2)$

$= \log_3 9$

$= 2$ ✓

[b] $32^{3x-6} = 8^{4-2x}$

$(2^5)^{3x-6} = (2^3)^{4-2x}$

$2^{5(3x-6)} = 2^{3(4-2x)}$

$5(3x-6) = 3(4-2x)$

$15x-30 = 12-6x$

$21x = 42$

$x = 2$

CHECK:

$32^{3(2)-6} = 8^{4-2(2)}$?

$32^0 = 8^0$?

$1 = 1$ ✓