Math 114
Midterm 3 Review

You should be able to solve the following without a calculator

[1] [a] If $f(x)=x^2+3x-5$, find $f(-2)$. [b] If $f(x)=\dfrac{2x}{x^2+1}$, find $f(3)$.

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

[2] Find the domains of the following functions.

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

[c] $f(x)=\sqrt{8-x}-6$ [d] $f(x)=4^x$

[e] $f(x)=\log_3 x$

[3] Find the ranges of the following functions.

[a] $f(x)=\dfrac{2}{x+5}-4$ [b] $f(x)=7-\sqrt{x+9}$

[c] $f(x)=5^x$ [d] $f(x)=\log_7 x$

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

[a] $\log_3\sqrt{3}$ [b] $\log_4\dfrac{1}{16}$

[c] $\log_5 125$ [d] $\log_7 0$

[e] $\log_8 -8$ [f] $\log_6 1$

[g] $\log_2 64$ [h] $\log 10000$

[i] $\log_4 4^6$ [j] $\log_8 8^{-3}$

[k] $3^{\log_3 7}$ [l] $6^{\log_6 0}$

[m] $5^{\log_5 -10}$ [n] $10^{\log 5}$

[6] Find the exact solutions of the following equations. **Check your answers.**

[a] $3^{2-x}=81$ [b] $8^{3x-7}=4^{6-x}$

[c] $\log_4(5x+9)=3$ [d] $\log_2(10x-2)-\log_2(x+1)=3$

You may use a non-graphing calculator for the following

[9] Draw the graphs of the following fuctions by finding and plotting functions values, and connecting to get the shape of the graph. Show the functions values of at least 4 points on your graph. LABEL ALL ASYMPTOTES CLEARLY.

[a] $f(x)=-2^{x-1}+3$

[YOU WILL BE PROVIDED WITH GRAPH PAPER ON THE MIDTERM]

x				
$f(x)$				

[b] $f(x) = -\log_2 x + 1$

[YOU WILL BE PROVIDED WITH GRAPH PAPER ON THE MIDTERM]

x				
$f(x)$				

[10] [a] If $f(x) = 2 - 3x - x^2$, find $f(a-1)$. [b] If $f(x) = 2x^2 + 5x + 1$, find $f(a+3)$.

[11] Which of the following are functions ?

[a]

x	2	5	8	9
$f(x)$	3	-2	-2	1

[b]

x	6	4	7	4
$f(x)$	3	-2	4	1

[c]

x	-1	3	0	10
$f(x)$	-1	3	0	10

[12] Find the inverses of the following functions.

[a] $f(x) = 5 - 2x$ [b] $f(x) = 4 - \sqrt{3-x}$

[13] Write as the logarithm of a single quantity.

[a] $\log 8 + \log 5$ [b] $\log 42 - \log 6$

[c] $5\log 2$ [d] $3\log x + 2\log y$

[e] $2\log x - \log y + \log z$ [f] $\log z - 2\log y - \log x$

[g] $2\log y + 3\log z - \log x$ [h] $4\log z + \log x + 3\log y$

[14] Write as the sums and/or differences and/or multiples of logarithms of numbers or single variables.

[a] $\log(7 \times 11)$ [b] $\log\left(\frac{13}{5}\right)$

[c] $\log 3^8$ [d] $\log r^4 s$

[e] $\log \frac{a^5}{b^2}$ [f] $\log \frac{m}{n^2 p^3}$

[g] $\log \frac{x^2}{\sqrt{yz}}$

[15] Find the exact solution of the following equations. Also, use your calculator to find a decimal answer, rounded to 4 decimal places.

[a] $7^x = 3$ [b] $6^{x-2} = 4^{x+1}$

[16] The number of bacteria in a colony is given by $B(t) = 1.3(2.1)^t$.

[a] How many bacteria were there at time $t = 4$? Round your answer to 1 decimal place.
[b] At what time were there at least 26 bacteria ? Round your answer to 1 decimal place.

[17] [a] Find the intensity (in microns) of an earthquake with a Richter magnitude of 5.6.
[b] Find the Richter magnitude of an earthquake of intensity 56,000,000 microns.

In addition, you should expect problems of the following types

Section 16.1.2: Finding the value of $f(a)$ from a graph of $y = f(x)$
Section 16.1.5: Determining if a graph represents a function
Section 16.3.2: Using interval notation
Section 16.5.1: Determining if a graph represents a one-to-one function
Section 16.5.2: Drawing the graph of the inverse of a function