## Math 114 Functions, Exponentials & Logarithms Review

## You should be able to solve the following without a calculator

[1]	Find th	e domains of the following functions.								
	[a]	$f(x) = 4^x$		[b]	f(x) =	$\log_3 x$				
[2]	Find th	e ranges of the following functions.								
	[a]	$f(x) = 5^x$		[b]	f(x) =	$\log_7 x$				
[3]	Evaluate the following. Write "UNDEFINED" if the value does not exist.									
	[a] [e] [i] [m]	$\log_8 - 8$ [f] ] $\log_4 4^6$ [j] ]	$\log_{6} 36$ $\log_{6} 1$ $\log_{8} 8^{-3}$ $10^{\log 5}$	[c] [g] [k]	$log_{5}123$ $log_{2}64$ $3^{log_{3}7}$			[d] [h] [1]	$\log_7 0$ $\log 10$ $6^{\log_6 0}$	
[4]	Find th	Find the exact solutions of the following equations. Check your answers.								
	[a] [c] [e]	$3^{2-x} = 81$ 1+2log <sub>4</sub> (5x+9) = 7 log <sub>2</sub> (10x-2) - log <sub>2</sub> (x+1) = 3		[b] [d] [f]	$8^{3x-7} = \log_3(x^2)$ $\log(2x)$	<sup>2</sup> – 7) –				
[5]	Write as the logarithm of a single quantity. Simplify your answer.									
	[a] [c] [e] [g]	log 8 + log 6 - log 2 5 log 2 2 log x - log y + log z 2 log y + 3 log z - log x		[b] [d] [f] [h]	log 48 - 3 log x - log z - 4 log z -	+ 2 log 2 log <i>y</i>	$y - \log x$	V		
[6]	Write a	Write as the sums and/or differences and/or multiples of logarithms of numbers or single variables.								
	[a]	log(7×11) [b]	$\log\left(\frac{13}{5}\right)$	[c]	log3 <sup>8</sup> [6		[d]	$\log r^4 s$		
	[e]	$\log \frac{a^5}{b^2}$ [f]	$\log \frac{m}{n^2 p^3}$	[g]	$\log \frac{x^2}{\sqrt{y^2}}$	 Z				
[7]	MULT	TIPLE CHOICE								
	[a]	The graph of $f(x) = 3\log(x+4)$ [i] $x = 4$ [ii]	has an asymptote at $x = -4$ [iii]	<i>y</i> = –	4	[iv]	<i>y</i> = 4		[v]	<i>y</i> = 3
	[b]	The graph of $f(x) = -5 \cdot 2^{x-3}$ has [i] $x = 3$ [ii] .	an asymptote at $x = 0$ [iii]	<i>y</i> = –	5	[iv]	<i>y</i> = 3		[v]	<i>y</i> = 0
	[c]	For the logarithm curve $f(x) = \log [i] \infty$ [ii]	$g_2 x$ , as the value of $x - \infty$ [iii]	$x \rightarrow \infty$ , th		$y \rightarrow$ [iv]	1		[v]	-1
	[d]	For the logarithm curve $f(x) = \log [i]$	$g_5 x$ , as the value of $x - \infty$ [iii]	$r \rightarrow 0$ , the 0		$v \rightarrow$ [iv]	1		[v]	-1

[8] Find the domains of the following functions.

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

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

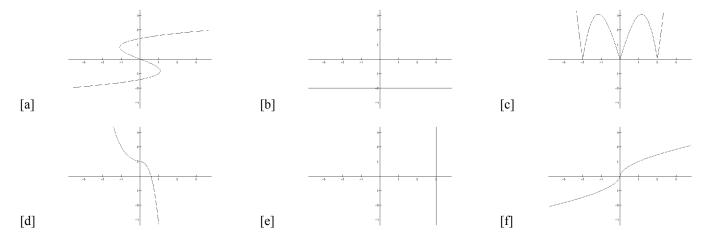
[9] Find the ranges of the following functions.

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

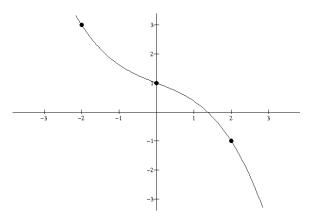
[10] Find the inverses of the following functions.

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

[11] Which of the following graphs represent one-to-one functions ?



[12] Sketch the graph of the inverse of the following function.



## You may use a non-graphing calculator for the following

- [13] Draw the graph of  $f(x) = -3 \cdot 2^{-(x-1)}$  by finding and plotting functions values, then sketching the shape of the graph. Show the function values of at least 5 points on your graph. LABEL ALL ASYMPTOTES CLEARLY.
- [14] Draw the graph of  $f(x) = 2\log_2\left(\frac{x+3}{2}\right)$  by finding and plotting functions values, then sketching the shape of the graph. Show the function values of at least 5 points on your graph. LABEL ALL ASYMPTOTES CLEARLY.
- [15] Find the exact solution of the following equations. Also, use your calculator to find a decimal answer, rounded to 4 decimal places. <u>Check your answers.</u>

[a] 
$$x = \log_7 3$$
 [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.
- At what time were there at least 41 bacteria ? Round your answer to 2 decimal places. [b]
- Find the intensity (in microns) of an earthquake with a Richter magnitude of 5.6. [17] [a]
  - Find the Richter magnitude of an earthquake of intensity 56,000,000 microns. [b]

If you deposit \$200 into an account that pays 2.35% interest annually, what is the value of the account 3 years later ? [18] [a]

- If you deposit \$200 into an account that pays 2.35% interest annually, when will the value of the account be \$300? [b]
- How much should you deposit into an account that pays 2.35% interest annually, if you want the value of the account to be [c] \$200 4 years later?
- You deposit \$200 into an account, and 5 years later, the value of the account is \$250. What is the annual interest rate on the [b] account?

## ANSWERS

[1]	[a]	all real numbers	[b]	$\{x > 0\}$					
[2]	[a]	$\{y > 0\}$	[b]	all real numbers					
[3]	[a]	4	[b]	2	[c]	3		[d]	UNDEFINED
	[e]	UNDEFINED	[f]	0	[g]	6		[h]	4
	[i]	6	[j]	-3	[k]	7		[1]	UNDEFINED
F 4 3	[m]	UNDEFINED	[n]	5 3	r 1	11		F 13	5
[4]	[a] [e]	-2 5	[b] [f]	3 7	[c]	11		[d]	-5
[5]	[c] [a]	log 24	[1] [b]	log 4	[c]	log32		[d]	$\log x^3 y^2$
[3]	[a]	-	נטן		[C]			լսյ	
	[e]	$\log \frac{x^2 z}{y}$	[f]	$\log \frac{z}{y^2 x}$	[g]	$\log \frac{y^2 z^3}{x}$		[h]	$\log z^4 x y^3$
[6]	[a]	$\log 7 + \log 11$	[b]	$\log 13 - \log 5$	[c]	8 log 3		[d]	$4\log r + \log s$
	[e]	$5\log a - 2\log b$	[f]	$\log m - 2\log n - 3\log n$	g p				
	[g]	$2\log x - \frac{1}{2}\log y - \frac{1}{2}$	log z						
[7]	[a]-[ii]		[b]-[v]		[c]-[i]			[d]-[ii]	
[8]	[a]	all real numbers	[b]	$\left\{x \neq \frac{3}{2}\right\}$	[c]	$\{x \le 8\}$			
[9]	[a]	$\{y \neq -4\}$	[b]	$\{y \le 7\}$					
[10]	[a]	$ \{y \neq -4\} $ $f^{-1}(x) = \frac{5-x}{2} $	[b]	$f^{-1}(x) = 3 - (4 - x)^2$	2				
[11]	[a]	no [b] no	[c]	no [d] yes	[e]	no [f] y	/es		
		3 2 -2 -1 -1 -1 -2 -2	2	3					
[12]		-3+							

