Math 114 Functions, Exponentials & Logarithms Review

You should be able to solve the following without a calculator

[1]	Find the domains of the following functions.												
	[a]	f(x)	$=4^{x}$				[b]	f(x)	$= \log_3 x$				
[2]	Find the 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]	$\log_{3} 8$ $\log_{8} -$ $\log_{4} 4$ $5^{\log_{5} - 10}$	1 8 6	[b] [f] [j] [n]	$log_6 36$ $log_6 1$ $log_8 8^{-3}$ $10^{\log 5}$		[c] [g] [k]	$log_{5}1$ $log_{2}6$ $3^{log_{3}7}$	25 4		[d] [h] [1]	$\log_7 0$ $\log 100$ $6^{\log_6 0}$	000
[4]	Find the exact solutions of the following equations. Check your answers.												
	[a] [c] [e]	$3^{2-x} = 81$ 1+2log ₄ (5x+9) = 7 log ₂ (10x-2) - log ₂ (x+1) = 3				[b] [d] [f]	$8^{3x-7} = 4^{6-x}$ $\log_3(x^2 - 7) - \log_3(1 - x) = 1$ $\log(2x + 6) + \log(x - 2) = 2$						
[5]	Write as the logarithm of a single quantity. Simplify your answer.												
	[a] [c] [e] [g]	log 8 + 5 log 2 2 log x 2 log y	$+ \log 6 - \log 2$ 2 $x - \log y + \log z$ $y + 3 \log z - \log z$	x			[b] [d] [f] [h]	log 48 3 log x log z - 4 log z	$3 - \log 6$ $x + 2 \log 9$ $- 2 \log 9$ $x + \log x$	$-\log 2$ y $-\log x$ $+3\log y$	V		
[6]	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 ⁸			[d]	$\log r^4$	5
	[e]	$\log \frac{a^5}{b^2}$	-	[f]	$\log \frac{m}{n^2 p^3}$		[g]	$\log \frac{x}{\sqrt{x}}$	$\frac{z^2}{yz}$				
[7]	MULTIPLE CHOICE												
	[a]	The gra [i]	where $f(x) = 31$ x = 4	log(<i>x</i> + 4 [ii]	4) has an asympto $x = -4$	ote at [iii]	<i>y</i> = -4	4	[iv]	<i>y</i> = 4		[v]	<i>y</i> = 3
	[b]	The gra [i]	where $f(x) = -3$ x = 3	$5 \cdot 2^{x-3}$ h [ii]	as an asymptote a $x = 0$	ıt [iii]	<i>y</i> = -:	5	[iv]	<i>y</i> = 3		[v]	<i>y</i> = 0
	[c]	For the [i]	logarithm curve ∞	f(x) = l[ii]	$\log_2 x$, as the val $-\infty$	ue of <i>x</i> - [iii]	$\rightarrow \infty$, the 0	e value o	$\begin{array}{c} f \ y \rightarrow \\ [iv] \end{array}$	1		[v]	-1
	[d]	For the [i]	logarithm curve ∞	f(x) = 1[ii]	$og_5 x$, as the val $-\infty$	ue of <i>x</i> – [iii]	$\rightarrow 0$, the 0	value of	$y \rightarrow$ [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
	[m]	UNDEFINED	[n]	5				
[4]	[a]	-2	[b]	3	[c]	11	[d]	-5
	[e]	5	[f]	7				
[5]	[a]	log 24	[b]	log4	[c]	log32	[d]	$\log x^3 y^2$
	[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]	$\log m - 2\log n - 3\log p$				
	[]	$2\log r = \log r = \frac{1}{\log r}$			1			
	lgj	$2 \log x - \frac{1}{2} \log y - \frac{1}{2} \log x$	Jg 2					
[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]	$f^{-1}(x) = \frac{5-x}{2}$	[b]	$f^{-1}(x) = 3 - (4 - x)^2$				
[11]	[a]	no [b] no	[c]	no [d] yes	[e]	no [f] yes		
			2	3				
[12]		-3+						

