MTH-PT Trigonometry Session 6 2/13

$17^{10v-4} - 8 = 71$

$+8 \quad +8$

$17^{10v-4} = 79$

$\log 17^{10v-4} = \log 79$

$(10v-4)\log 17 = \log 79$

$\frac{(10v-4)\log 17}{\log 17} = \frac{\log 79}{\log 17}$

$10v - 4 = \frac{\log 79}{\log 17}$

$+4 \quad +4$

$\frac{10v}{10} = \frac{\frac{\log 79}{\log 17} + 4}{10}$

$v = \frac{\frac{\log 79}{\log 17} + 4}{10}$

$11^{2-7x} - 6 = 54$

$+6 \quad +6$

$\log 11^{2-7x} = \log 60$

$(2-7x)\log 11 = \log 60$

$\frac{(2-7x)\log 11}{\log 11} = \frac{\log 60}{\log 11}$

$2 - 7x = \frac{\log 60}{\log 11}$

$-2 \quad -2$

$\frac{-7x}{-7} = \frac{\frac{\log 60}{\log 11} - 2}{-7}$

$x = \frac{\frac{\log 60}{\log 11} - 2}{-7}$

Pre-Calculus Chapter 3 Pre-Test

1.) (2 pts each, 6 pts total) Evaluate exactly. Do not use decimals.

a) 7^{-2} $= \frac{1}{7^2} = \frac{1}{49}$ $\frac{7}{7\cdot7\cdot7} = 7^{1-3} = 7^{-2}$ $= \frac{1}{7\cdot7} = \frac{1}{7^2}$

b) $8^{2/3}$ $\left(\sqrt[3]{8}\right)^2 = (2)^2 = 4$

c) $(1/4)^{5/2}$ (power ↓, root ↑)

$\left(\sqrt{\frac{1}{4}}\right)^5 \left(\frac{\sqrt{1}}{\sqrt{4}}\right)^5 = \left(\pm\frac{1}{2}\right)^5$ $\pm\frac{1^5}{2^5} = \pm\frac{1}{32}$

$\frac{1}{4} = \left(2^{-2}\right)^{5/2}$ $2^{-5} = \frac{1}{2^5} = \frac{1}{32}$

2.) (2 pts each, 4 pts total) Evaluate each function.

a) $f(x) = 4^x,\ x = 3$

$f(3) = 4^3 = 64$

$4\cdot4 = 16\cdot4 = 64$

b) $g(x) = 10^{x+4},\ x = -2$

$g(-2) = 10^{-2+4} = 10^2 = 100$

3.) (5 pts each, 10 pts total) Graph each function. Identify at least two points on the line (please use points indicated in class).

a) $y = 3^{x+2}$

left 2

3^x

$x=0$ $(0,1)$ $3^0 = 1$

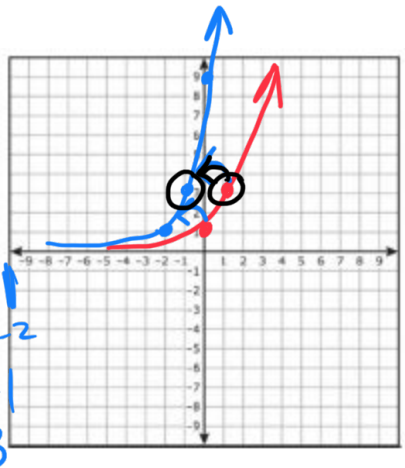
$x=1$ $(1,3)$ $3^1 = 3$

$3^{0+2} = 3^2 = 9$

$y = 3^{(x+2)}$

$x+2=0$
$-2\ -2$
$x=-2$
$y=1$
$(-2,1)$

$x+2=1$
$-2\ -2$
$x=-1$
$y=3$
$(-1,3)$



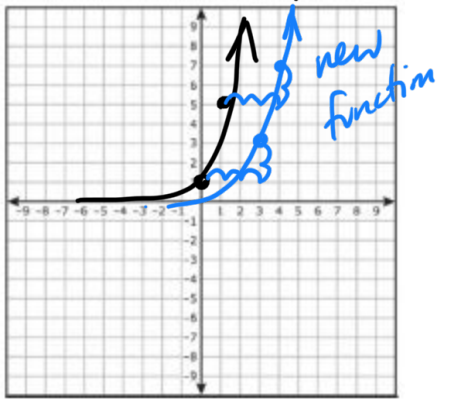
b) $y = 5^{x-3} + 2$

right 3 up 2

Parent $y = 5^x$

$x=0$ $y=1$

$x=1$ $y=5$



4.) (2 pts each, 4 pts total) Write each logarithmic equation in its equivalent exponential form.

a) $\log_6 216 = 3$

$6^3 = 216$

b) $\log_b x = a$

$b^a = x$

5.) (2 pts each, 4 pts total) Write each exponential equation in its equivalent logarithmic form.

a) $4^7 = 16384$ $\log_4 16384 = 7$

b) $0.001 = 10^{-3}$ $\log 0.001 = -3$

6.) (2 pts each, 4 pts total) Evaluate the logarithms exactly. Show conversion to exponential form for full credit.

a) $\log_8 1 = x$ $8^x = 1$ $x = 0$

b) $\log 10^{-5} = x$ (10) $10^x = 10^{-5}$ $x = -5$

7.) (8 pts total) State the domain of the logarithmic function. Please show work (do not simply graph).

$$f(x) = \log_3 (x - 2)$$

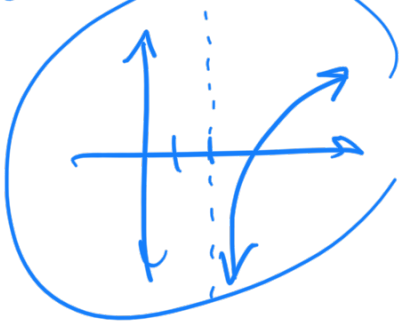
$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$

$\log_3 (x-2) = a$ $3^a = x-2$

$x - 2 > 0$

$+2 \quad +2$

$x > 2$



8.) (2.5 pts each, 5 pts total) Apply the properties of logarithms to simplify each expression.

a) $8^{3\log_8 5}$

b) $e^{\ln(x^2-4)} = 2$

$e^{\log_e(x^2-4)} = 2$

$\ln(x^2-4) = \ln 2$

$x^2 - 4 = 2$

$+4 \quad +4$

$\sqrt{x^2} = \sqrt{6}$

$x = \pm\sqrt{6}$

9.) (5 pts each, 10 pts total) Write each expression as a sum or difference of logarithms.

a) $\log_b\left(\frac{x^2y^7z^{-3}}{a^4}\right)$ $2\log_b x + 7\log_b y - 3\log_b z - 4\log_b a$

b) $\log_b\left(\frac{x^2+2x-3}{x^2-6x+8}\right)$

10.) (5 pts each, 10 pts total) Write each expression as a single logarithm.

a) $6\log_b a + 2\log_b c - 3\log_b d$

b) $\frac{1}{2}\log e - 3\log f - 2\log h$

11.) (5 pts each, 10 pts total) Evaluate each logarithm using change-of-base formula.

a) $\log_9 23 = x$

Logs are exponents!

$\log 9^x = \log 23$

$x \log 9 = \log 23$

$x = \frac{\log 23}{\log 9}$

b) $\log_2 a$

12.) (5 pts each, 15 pts total) Solve each exponential equation. Leave answers as a fraction if necessary (no decimals).

a) $\log(3x + 4) = 2$

10

$10^2 = 3x + 4$

$100 = 3x + 4$

$-4 \quad -4$

$96 = 3x$

$\frac{96}{3} = \frac{3x}{3}$

$x = 32$

b) $\log_2(x - 2) + \log_2(x + 4) = 4$

c) $ln\,(x) + ln\,(x + 2) - ln\,(3x) = 6$

13.) (1 pts each, 10 pts total) Complete the table by including the corresponding letter.

Graph Name	Model	Graph
Gaussian distribution	c	h
Logistic growth	d	g
Exponential growth	a	
Logarithmic	e	f
Exponential decay	b	i

a) $f(t) = ce^{kt}\ k > 0$

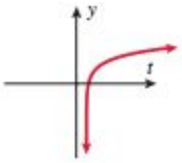
b) $f(t) = ce^{-kt}\ k > 0$

c) $f(x) = ce^{\frac{-(x-a)^2}{k}}$

d) $f(t) = \frac{a}{1 + ce^{-kt}}$

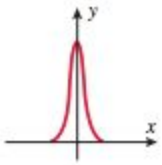
e) $f(t) = a + c\ log\ t$

f)



g)

h)



i)

j)