

Quiz #07

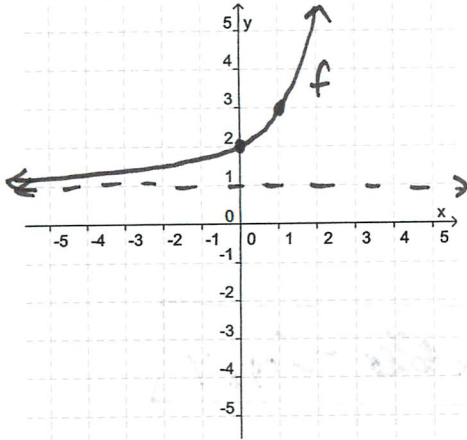
Math 130, Section 21, David Beydler

Name: Solutions  
 Wednesday, November 9, 2011

Directions: Show all work to get full credit. No calculators, books, notes. Please box your answers. Good luck!

(15 points total)

1. (1.5 points) Graph  $f(x) = 2^x + 1$



2. (2 points) Solve the following equation.

$$4^{x-2} = 2^{3x+3}$$

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

$$2^{2x-4} = 2^{3x+3}$$

$$2x - 4 = 3x + 3$$

$$-7 = x$$

$$\boxed{\{-7\}}$$

3. (2 points) Find the required annual interest rate for \$1200 to grow to \$1500 if interest is compounded quarterly for 5 years. Hint:  $A = P(1 + \frac{r}{n})^{tn}$

$$1500 = 1200(1 + \frac{r}{4})^{20}$$

$\uparrow$  P                       $\uparrow$  A                       $\uparrow$  n=4                       $\uparrow$  t

$$\frac{1500}{1200} = (1 + \frac{r}{4})^{20}$$

$$\frac{5}{4} = (1 + \frac{r}{4})^{20}$$

$$(\frac{5}{4})^{1/20} = 1 + \frac{r}{4}$$

$$\frac{r}{4} = (\frac{5}{4})^{1/20} - 1 \rightarrow r = \boxed{4(\frac{5}{4})^{1/20} - 4}$$

4. (2 points) Solve the logarithmic equation.

$$\log_x 25 = -2$$

$$x^{-2} = 25$$

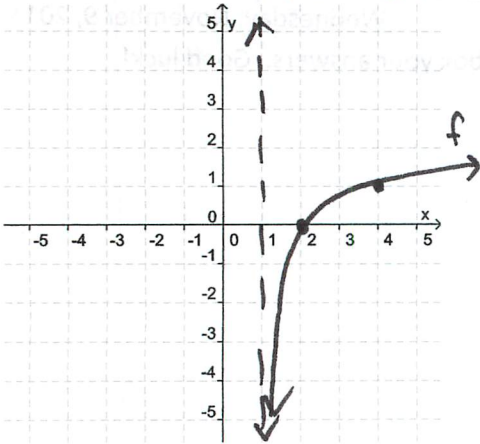
$$x^2 = \frac{1}{25}$$

$$x = \pm \frac{1}{5}$$

$$\boxed{\{\frac{1}{5}\}}$$

Base must be positive

5. (1.5 points) Graph  $f(x) = \log_3(x - 1)$



6. (1 point) Use the properties of logarithms to rewrite the following expression:

$$\log_m \sqrt{\frac{5r^3}{z^5}} = \log_m \left( \frac{5r^3}{z^5} \right)^{1/2}$$

$$= \frac{1}{2} \log_m \left( \frac{5r^3}{z^5} \right)$$

$$= \frac{1}{2} (\log_m 5 + \log_m r^3 - \log_m z^5)$$

$$\log_2 \frac{6x}{y} = \log_2 6 + \log_2 x - \log_2 y$$

7. (1 point) Use the change-of-base theorem to rewrite the following logarithm using  $\ln$ 's.

$$\log_{1/2} 3 = \frac{\ln 3}{\ln 1/2}$$

8. (2 points) Solve the exponential equation.

$$4^{x-1} = 3^{2x}$$

$$\ln 4^{x-1} = \ln 3^{2x}$$

$$(x-1) \ln 4 = 2x \ln 3$$

$$x \ln 4 - \ln 4 = 2x \ln 3$$

$$x \ln 4 - 2x \ln 3 = \ln 4$$

$$x (\ln 4 - 2 \ln 3) = \ln 4$$

$$x = \frac{\ln 4}{\ln 4 - 2 \ln 3}$$

$$\left\{ \frac{\ln 4}{\ln 4 - 2 \ln 3} \right\}$$

9. (2 points) Solve the logarithmic equation.

$$\ln x + \ln x^2 = 3$$

$$\ln x \cdot x^2 = 3$$

$$\ln x^3 = 3$$

$$e^3 = x^3$$

$$e = x$$

$$\{e\}$$