

Name: Solutions

Math 156 PRECALCULUS  
Fall 2015

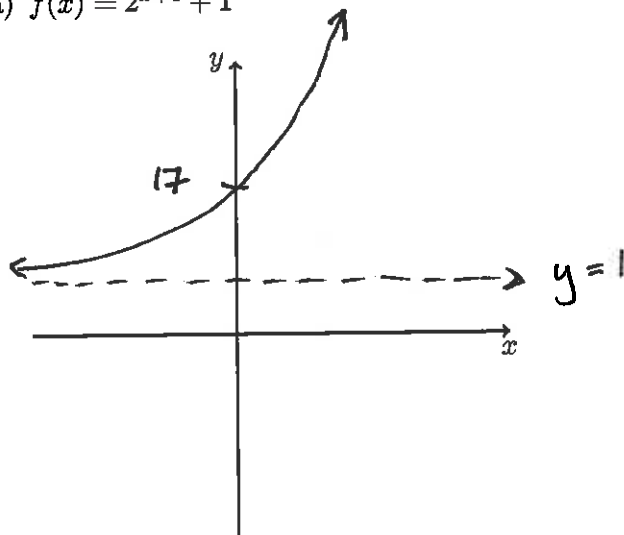
**Quiz 7 – Version One**

Thursday, October 29, 2015

This quiz has 8 problems worth a total of 30 points. It is TWO SIDED.

1. (4 points each) Sketch the graphs of the functions below and **LABEL** (a) any asymptotes and (b) any  $x$ - or  $y$ -intercepts. State the domain and range.

(a)  $f(x) = 2^{x+4} + 1$

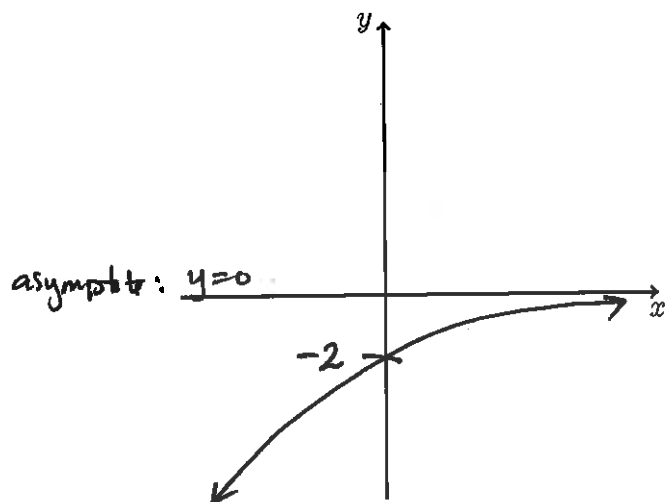


domain:  $(-\infty, \infty)$

range:  $(1, \infty)$


$$f(0) = 2^4 + 1 = 17$$

(b)  $f(x) = -2e^{-x}$



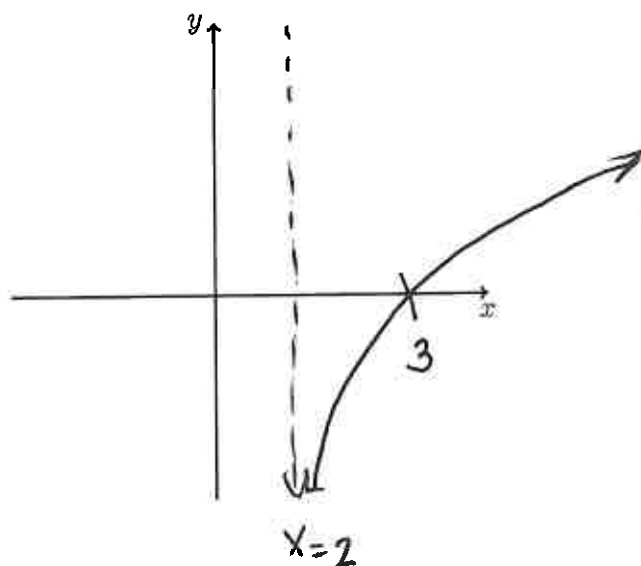
domain:  $(-\infty, \infty)$

range:  $(-\infty, 0)$



$$y = e^{-x} \quad f(0) = -2e^0 = -2$$

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



domain:  $(2, \infty)$

range:  $(-\infty, \infty)$

$f(3) = 0$

2. (2 points) Express the equation  $\log 4 = 5t$  in exponential form. (You don't need to solve it.)

Answer:  $10^{5t} = 4$

3. (2 points) Express the equation  $e^{0.9t} = s$  in logarithmic form.

Answer:  $\ln s = 0.9t$

4. (2 points each) Evaluate the expressions below.

(a)  $\log_9 \sqrt{3} = y$

$$\begin{aligned} 9^y &= \sqrt{3} \\ 3^{2y} &= 3^{\frac{1}{2}} \end{aligned} \quad \rightarrow \quad \begin{aligned} 2y &= \frac{1}{2} \\ y &= \frac{1}{4} \end{aligned}$$

Answer:  $\frac{1}{4}$

(b)  $e^{\ln 10}$

(peel of exponent)

Answer:  $10$

(c)  $\log_4 8 = y$

$$\begin{aligned} 4^y &= 8 \\ 2^{2y} &= 2^3 \end{aligned} \quad \rightarrow \quad \begin{aligned} 2y &= 3 \\ y &= \frac{3}{2} \end{aligned}$$

Answer:  $\frac{3}{2}$

5. (2 points) find the domain of the function  $h(x) = \ln x + \ln(2 - x)$ . Give your answer in interval notation.

We need  $x > 0$  and  $2 - x > 0$

So  $x > 0$  and  $2 > x$ .

Answer:  $(0, 2)$

6. (2 points) Use the Laws of Logarithms to evaluate the expression

$$\boxed{\frac{-1}{3} \log_5 125}$$

Answer: -1

$$= -\frac{1}{3} \log_5 5^3 = -\frac{1}{3} \cdot 3 \log_5 5 \quad (\text{use } \log_5 5 = 1)$$

$$= -\frac{1}{3} \cdot 3 = -1$$

7. (2 points) Use the Laws of Logarithms to expand the expression

$$\boxed{\ln \left( \frac{\sqrt{3}x^5}{2y^2} \right)}$$

Answer:  $\frac{1}{3} \ln 3 + \frac{5}{2} \ln x - \ln 2 - 2 \ln y$

$$= \ln \left( \frac{\sqrt{3} x^{5/2}}{2 y^2} \right)$$

$$= \frac{1}{3} \ln 3 + \frac{5}{2} \ln x - \ln 2 - 2 \ln y$$

8. (2 points) Use the Laws of Logarithms to combine the expression:

$$\boxed{\log_a(a+b) + \log_a(a-b) - 2 \log_a c}$$

Answer:  $\log_a \left( \frac{a^2 - b^2}{c^2} \right)$

$$= \log_a ((a+b)(a-b)) - \log_a c^2$$

$$= \log_a \left( \frac{a^2 - b^2}{c^2} \right)$$