

October 14, 2010

Note Title

10/14/2010

§5.1 #54]

Radioactive decay

$$A_0 = 300 \text{ mg}$$

$$h = 2.807 \text{ days}$$

$$t = 7 \text{ days.}$$

$$\begin{aligned} A(t) &= A_0 \left(\frac{1}{2}\right)^{t/h} \\ &= 300 \left(\frac{1}{2}\right)^{\frac{7}{2.807}} \end{aligned}$$

$$\approx 175 \text{ mg.}$$

Compound Interest

What P_0 ?

$$P(t) = P_0 \left(1 + \frac{r}{n} \right)^{nt}$$

$r = 0.03$ per year

$$n = 52$$

$$P = 80,000$$

$$t = 15$$

$$80,000 = P_0 \left(1 + \frac{0.03}{52} \right)^{(52)(15)}$$

$$80,000 = P_0 (1.5681)$$

$$P_0 = \frac{80,000}{1.5681} \approx \$51016.87$$

Logarithmic

Example

$$a) \log_2 8 = 3 \quad \text{if and only if} \quad 8 = 2^3$$

Exponential

logarithmic

$$b) \log_9 3 = \frac{1}{2} \quad \Leftrightarrow \quad 3 = 9^{\frac{1}{2}}$$

$$c) \log_5 \left(\frac{1}{25} \right) = -2 \iff \frac{1}{25} = 5^{-2}$$

Example

Exponential

$$a) 16 = 2^4 \iff 4 = \log_2 16$$

Logarithmic

$$b) 9 = \sqrt{81} \iff \frac{1}{2} = \log_{81} 9$$

Example

Q.) Let $y = \log_3 81$ logarithmic

$3^y = 81$ exponential

$$3^y = 3^4$$

$$\therefore y = 4$$

$$\boxed{\log_3 81 = 4}$$

$$b) \quad y = \log_{169} 13 \quad \text{Logarithmic}$$

$$169^y = 13 \quad \text{Exponential}$$

$$(13^2)^y = 13$$

$$13^{2y} = 13^1$$

$$\Rightarrow 2y = 1$$

$$y = \frac{1}{2}$$

$$\log_{169} 13 = \frac{1}{2}$$

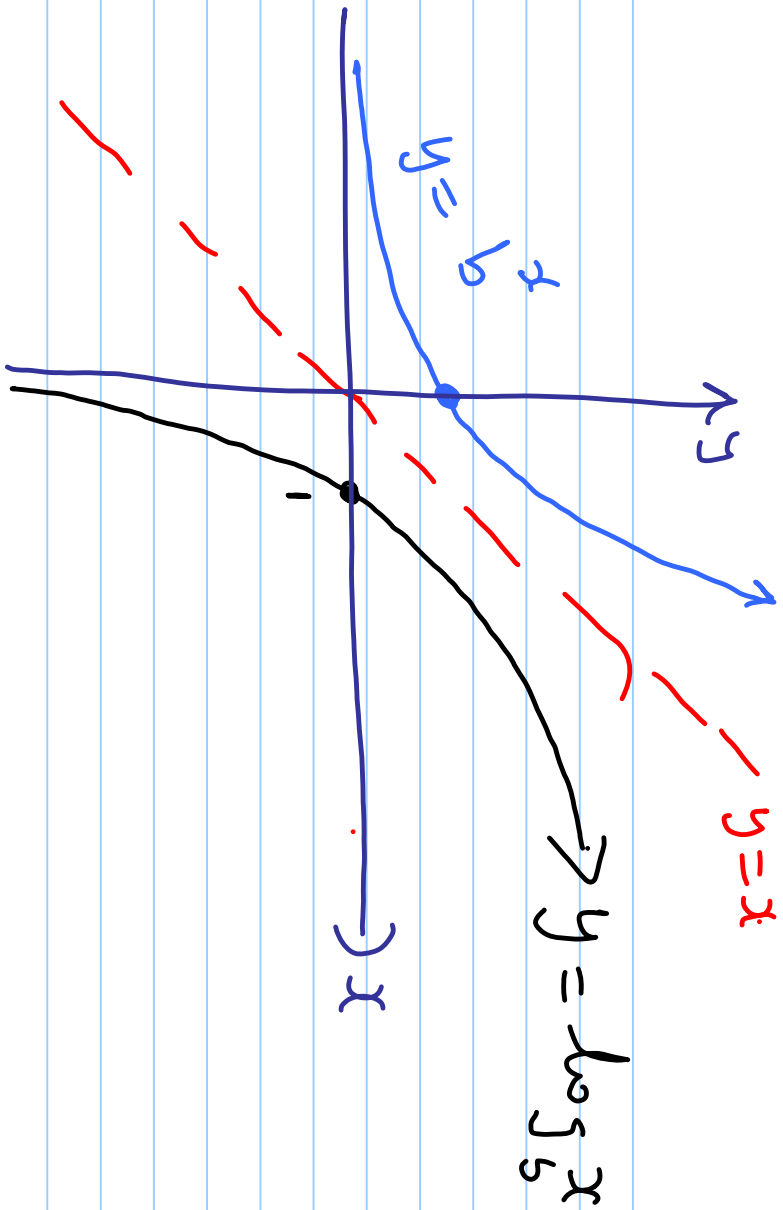
c) $y = \log_5 \left(\frac{1}{5} \right) \Leftrightarrow 5^y = \frac{1}{5}$

$$5^y = 5^{-1}$$

$$y = -1$$

$$\boxed{\log_5 \left(\frac{1}{5} \right) = -1}$$

Graph



Example

$$a) f(x) = \log_b(x-4)$$

$$\text{Domain: } x-4 > 0$$

$$x > 4$$

$$(4, \infty)$$