6.3 Notes Day 2

Common Logarithm: logarithm with a base 10. $\log x \rightarrow \log_{10} x$ (base 10 implied)

Solve

① $\log(x+3) = 2$

$x+3 = 10^2$

$x+3 = 100$

$x = 97$

② $2\log(x+2) - 4 = -2$

$2\log(x+2) = 2$

$\log(x+2) = 1$

$x+2 = 10^1$

$x = 8$

③ $2^{x+4} = \frac{1}{64}$

$x+4 = \log_2\left(\frac{1}{32}\right)$

$x+4 = -5$

$x = -9$

④ $9 = 2\log_2(x-3) + 3$

$6 = 2\log_2(x-3)$

$3 = \log_2(x-3)$

$8 = x-3$

$11 = x$

Change of Base Formula

$$\log_b a = \frac{\log a}{\log b}$$ ← Base 10 for both

Solve w/ a calc (dont round until the end)

① $10^{2x-1} = 25$

$2x - 1 = \log 25$

$2x - 1 = 1.3979$

$2x = 2.3979$

$\boxed{x \approx 1.199}$

② $3\log(3x-2) = 2$

$\log(3x-2) = 2/3$

$3x - 2 = 10^{2/3}$

$3x - 2 = 4.642$

$3x = 6.642$

$\boxed{x = 2.214}$

Application

A landowner released rabbits new to the area. The population growth rate can be modeled by $P(t) = 24(3.5)^t$ where t represents yrs since rabbits released & $P(t)$ represents population

a) How many rabbits initially released?

24 rabbits

b) How long until there are 10000 rabbits

$$10000 = 24(3.5)^t$$

$$\frac{10000}{24} = 3.5^t$$

$$\log_{3.5}\left(\frac{10000}{24}\right) = t$$

$$t = 4.815$$

4.815 yrs