

VODINA EFEM  
16/ENG03/020  
CIVIL ENGINEERING  
ENG 282

Sign: ~~Handwritten~~

$$\frac{dy}{dt} \propto y$$

$$\frac{dy}{dt} = k \cdot y$$

$$\frac{1}{y} = \frac{k}{dt}$$

$$\int dt = \frac{1}{k} \int \frac{dy}{y}$$

$$t + c = \frac{1}{k} \cdot \ln y$$

$$kt + c = \ln y$$

Dividing through by  $\ln$

$$e^{kt+c} = y$$

$$e^{kt} \cdot e^c = y$$

$$C e^{kt} = y$$

$$y(t) = C e^{kt}$$

When  $t=0$   $y=20$

$$\therefore 20 = C \cdot e^{k \cdot 0}$$

$$20 = C$$

$$C = 20$$

When  $t=5$ .

$$y(5) = 20 \cdot e^{k \cdot 5} \quad y=40$$

$$40 = 20 \cdot e^{5k}$$

~~20 = e^{sk}~~  
Multiply both sides by  $\ln$ .  
 $2 = e^{sk}$   
 $\ln 2 = sk$   
 $0.69315 = sk$   
 $k = 0.1386$

$$y(x) = 20 \cdot e^{0.1386t}$$

$\therefore$  When  $t = 36$  hrs  $y = ?$   $1\frac{1}{2}$  days = 36 hrs.

$$\begin{aligned} y(36) &= 20 \cdot e^{0.1386 \cdot 36} \\ &= 2937.55 \text{ bacteria} \end{aligned}$$



