Mon Tue Wed Thu Fri Sat Sun

Date:

- **Applications of Differential Equations**
- **Mathematical Modelling**
- **Bacterial Growth**

At $t_0 = P_0$

at t_1 (1 hour) $= \frac{3}{2} P_0$

Rate of Growth $\propto P(t)$

$$\frac{dP}{dt} \propto P(t)$$

$$\frac{dP}{dt} = kP$$

$$\frac{1}{P} dp = k\,dt$$

$$\int \frac{1}{P} dp = k \int 1\,dt$$

$$\ln p = kt + C$$

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

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

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

At t_0 $(t_0 = 0)$

$$P_0 = c\, e^{k(0)}$$

$$P_0 = c\, e^{0}$$

$$P_0 = c$$

$$P_0 = c\, e^{kt}$$

$$P_0 = P_0 e^{kt}$$

$$P = P_0 e^{kt}$$

at $t = 1$ hour

$$t_1 = \frac{3}{2} P_0$$

$$\frac{3}{2} P_0 = P_0 e^{k(1)}$$

$$\frac{3}{2} = e^{k}$$

$$e^{k} = 1.5$$

$$k = \ln(1.5)$$

$$k = 0.4055$$

$$P = P_0 e^{(0.4055)t}$$

HERO PREMIUM