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COURSE: ENG 282 [ASSIGNMENT 1]

$$y' = ky$$

$$\frac{dy}{dt} = ky$$

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

$$\ln y = kt + c$$

$$y = e^{kt+c} \Rightarrow e^{kt} \times e^{c}$$

let $e^{c} = y_0$

$$y = e^{kt} \cdot y_0 \Rightarrow y = y_0 e^{kt}$$

(a) From the question

$$y = 2y_0$$

i.e. $y_0 \cdot e^{kt} = 2y_0$

at $t = 5hrs$

$$2y_0 = y_0 e^{5k}$$

$$2 = e^{5k}$$

$$\ln 2 = 5k$$

$$k = \frac{\ln 2}{5} = 0.1386$$

Recall $y_0 = 20$, $k = 0.1386$

$$\therefore y = 20 \times e^{0.1386t}$$ [Required model]

(b) $1\frac{1}{2}$ days $\equiv 36hrs$

$t = 36hrs$

$$y = 20 \times e^{0.1386(36)}$$

$$y = 2937.5532$$

(c) Solution As seen in the Excel document attached

(d- Solution As seen in the Excel document attached

e. Increase in time was directly proportional to the increase in the population of the bacteria i.e Population growth of the bacteria in the growth medium ~~led to an increase~~ was followed by an increase in time.