

Bugo Sphenekas
17ENG041083
ENG 282

Electrical and Electronic
Engineering

Assignment 1 solution.

Solution through Exponential Growth Model.

$$y' = ky$$

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

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

$$\ln y = kt + c$$

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

$$y = y_0 e^{kt}$$

$$y = y_0 e^{kt}$$

$$y = 2y_0 \text{ (when } t=5)$$

$$2y_0 = y_0 e^{(k \cdot 5)}$$

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

integrate ln

$$5k = \ln 2$$

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

$$k = 0.1386$$

$$y = 20 e^{0.1386t}$$

For 1 1/2 days (36 hrs)

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

$$y = 2987.55 \text{ bacteria}$$