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16/MHS01/029
Computer Engineering
Engineering Mathematics II

Assignment I

(a) $\frac{dy}{dt} \propto y$

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

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

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

$$\ln y = kt + c$$

$y = Ce^{kt}$ (for growth)

y at $t = 0 = 20$

$$20 = Ce^{k\times 0}$$

$$20 = Ce^{0}$$

$$20 = C$$

$$C = 20$$

$\therefore y = 20e^{kt}$ (This is the model created)

At $t = 0$ $C = 20$

At $t = 5hr = 20\times 2$ (It was doubled)

C at $5hr = 40$

y at $5hr = 40$, $t = 5$, $c = 20$

$$y = 20e^{kt}$$

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

divide both sides by 20

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

$$\ln 2 = \ln \times e^{5k}$$

$$\ln 2 = 5k$$

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

$$k = 0.1386$$

(b) A day = 24hr

½ day = 12hr

1½ day = 24 + 12

$t = 36hr$

$K = 0.1386$

$y = 20e^{kt}$

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

$y = 2937.6$

(c) Done in excel spreadsheet

(d) Done in microsoft excel

(e) It was seen that as the time increased the value of y increased but the value of y depended on the three different values of C given. The higher the value of C the higher the value of y. The bacterial growth depends on the initial value