$2 = e^{5k}$

$5k = \ln 2$

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

$k = 0.1386$

$y = 20e^{0.1386t}$

For $1\frac{1}{2}$ days = [36 hours]

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

$y = 2937.55$ bacteria.

An experiment is carried out by a biomedical Engineer using a certain type of bacteria that doubles in population every 5hr in a growth medium. If the experiment is commenced with 20 bacteria

Develop a model for the system

Use the model to estimate the population of the bacteria in 1½ days.

With the aid of Microsoft Excel, simulate the model & plot the variation of the number of bacteria with time t for t = 0 to t = 15hr using a step size of 0.25hr.

Making the initial number of bacteria ~~with time for t = 0 to t = 30hr using a step size~~ to be 10, 30 & 50 successfully, plot the variations of the number of bacteria with time t = 0 to t = 30hr using a step time of 0.5hr on the same graph.

Comment on the results obtained in d.

~~Solu~~

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

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

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

$$\ln y = kt + c$$

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

$$y = ce^{kt} \quad \therefore c = y_0$$

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

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

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

	Y1	Y2	Y3
0	10	30	50
5	10.71758	32.15273	53.58788
1	11.48665	34.45994	57.43323
5	12.3109	36.9327	61.5545
2	13.1943	39.58291	65.97151
5	14.14109	42.42328	70.70547
3	15.15583	45.46748	75.77914
5	16.24337	48.73012	81.21687
3	17.40896	52.22688	87.04481
5	18.65819	55.97456	93.29094
5	19.99706	59.99117	99.98528
2	21.432	64.296	107.16
3	22.96991	68.90973	114.8495
3	24.61818	73.85453	123.0909
3	26.38472	79.15416	131.9236
3	28.27803	84.83408	141.3901
3	30.30719	90.92158	151.536
3	32.48197	97.4459	162.4098
3	34.8128	104.4384	174.064
3	37.31088	111.9327	186.5544
3	39.98823	119.9647	199.9411
3	42.85769	128.5731	214.2885
3	45.93306	137.7992	229.6653
3	49.22911	147.6873	246.1455