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16/ENG06/055
Mechanical Engineering

Using the Exponential Growth method

$$y' = ky$$

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

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

$$\ln y = kt + C$$

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

$$y = Ce^{kt} \quad \therefore C = y_0$$

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

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

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

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

$$5k = \ln 2$$

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

$$k = 0.1386$$

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

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

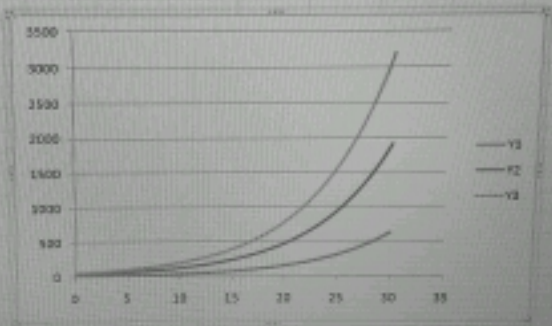
$$y = 20 e^{0.1386 \times 36}$$

$$y = 2937.55 \text{ bacteria}$$

Chart 1 - [X] [Y] [Z] [A] B

A B C D E F G H I J K L M N O P Q R S

T	Y1	Y2	Y3
0	0	10	30
0.5	10.71758	32.15273	53.58788
1	11.48865	34.45994	57.43323
1.5	12.3109	36.9227	61.5545
2	13.1943	39.58291	65.97151
2.5	14.14109	42.42328	70.70547
3	15.15583	45.46748	75.77914
3.5	16.24337	48.73012	81.21687
4	17.40896	52.22888	87.04481
4.5	18.65819	55.97856	93.29094
5	19.99706	59.99117	99.98528
5.5	21.432	64.295	107.18
6	22.96991	68.90973	114.8495
6.5	24.61818	73.85453	122.9809
7	26.38472	79.15416	131.6236
7.5	28.27893	84.83468	140.8391
8	30.30719	90.92158	150.6826
8.5	32.48197	97.45059	162.2098
9	34.81328	104.4384	174.064
9.5	37.31088	111.9227	186.5544
10	39.98823	119.9647	199.9411
10.5	42.85789	128.5731	214.2885
11	45.92306	137.7992	229.6953
11.5	49.12211	147.6873	246.1455
12	52.78168	158.285	263.8084
12.5	56.94773	169.6432	282.7387



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	T	Y																
2		0	20															
3		0.25	20.70515															
4		0.5	21.43515															
5		0.75	22.1909															
6		1	22.97328															
7		1.25	23.78327															
8		1.5	24.6218															
9		1.75	25.4899															
10		2	26.3888															
11		2.25	27.319															
12		2.5	28.28219															
13		2.75	29.27934															
14		3	30.31165															
15		3.25	31.38036															
16		3.5	32.48675															
17		3.75	33.63234															
18		4	34.81792															
19		4.25	36.04551															
20		4.5	37.31638															
21		4.75	38.63285															
22		5	39.99411															
23		5.25	41.40042															
24		5.5	42.8524															
25		5.75	44.35027															
26		6	45.89442															
27		6.25	47.58533															

