

Problem Solving Assignment Exponential Modeling

1. Population Growth

(i) $y = 1.1e^{(.015)(n)}$

(ii) $n=40\text{yrs}$

The year will be 2030 when the population reaches the 2 billion mark.

```

F1-  F2-  F3-  F4-  F5  F6-
Tools Algebra Calc Other Pr3mID Clean Up
■ 40 + 1990                                2030
■ solve(2 = 1.1 * e^-.015 * x, x)
  x = 39.8558
■ (x = 39.855800050374) + 1990
  x + 1990 = 2029.86
-----
MAIN          DEG AUTO          FUNC PRGM 30/30

```

(iii) China's population in 2004 will be 1.36 billion. The actual figures are 1.3 billion according to the People's Republic of the United States.

```

F1-  F2-  F3-  F4-  F5  F6-
Tools Algebra Calc Other Pr3mID Clean Up
■ (x = 39.855800050374) + 1990
  x + 1990 = 2029.86
■ 2004 - 1990                                14
■ solve(x = 1.1 * e^-.015 * 14, x)
  x = 1.35705
-----
MAIN          DEG AUTO          FUNC PRGM 30/30

```

(iv) $y = 1.1 - 1.7(.015)^{(n)}$

Subtract seventeen million from 1.1 billion because seventeen people are leaving China. This changes the growth of the population of China.

2. Prescribing Medicine

(i) $c=30(1/2)^x$ $y=1800(1/2)^{30}$

X (# of hours)	Y (mass leftover)
4	7.5000
8	9.3750
12	9.3438
16	9.3610
20	9.99688

F1 Tools	F2 Setup	F3 Units	F4 In Order	F5 In Time	F6 In Time
x	u1				
0.	1.7E-6				
1.	1.7E-6				
2.	1.7E-6				
3.	1.7E-6				
4.	1.7E-6				

x=1.
MAIN DEG AUTO FUNCTION

(ii) After ten days, there will be 1.7×10^{-6} in the patient's system. There is an asymptote at 10 and the highest amount where the medication could reach is 9.99688mg but will never reach 10.

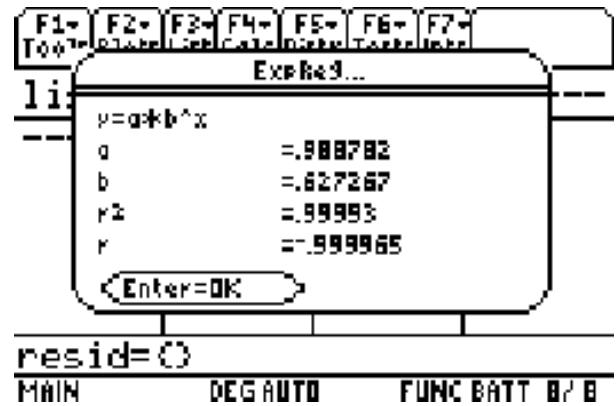
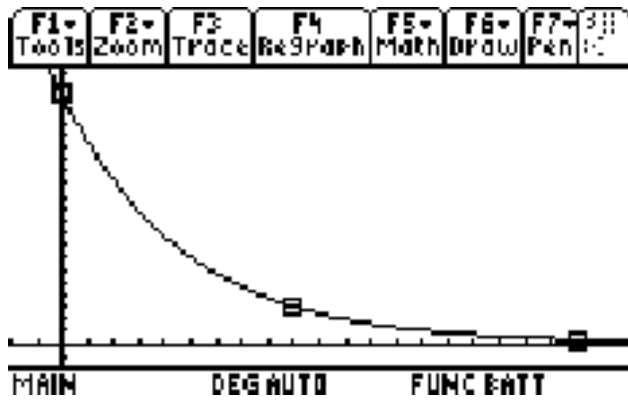
(iii) $Y = 9.99688 \text{mg} (1/2)^{(x*2)}$

If the patient stops taking the medication after ten days, using this equation, there will be less than .001mg in the patient.

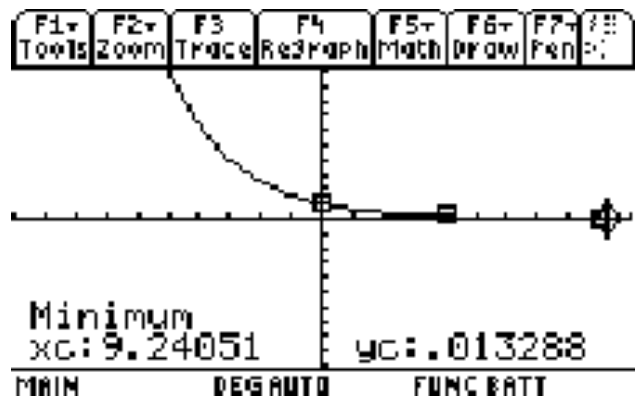
3. Determining Concentration

Experiment 1

	Experiment 1	Experiment 2
Concentration at 0 hrs	1.0mg/mL	1.5mg/mL
Concentration at 4 hrs	0.15mg/mL	0.25mg/mL
Concentration at 9 hrs	0.015mg/mL	0.021mg/mL

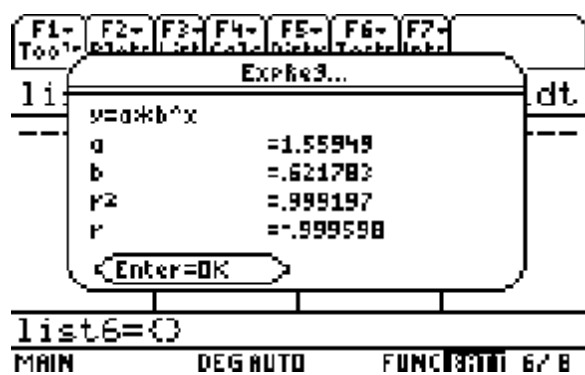
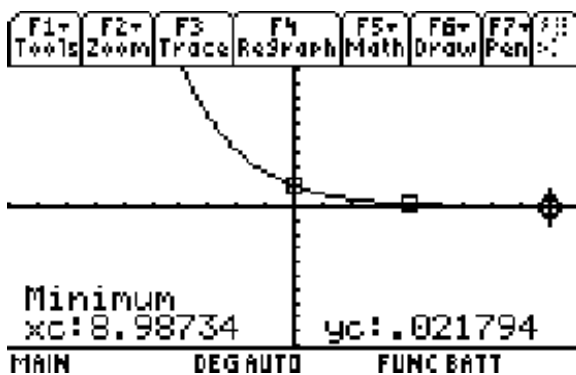


F1- Tools	F2- Setup	F3- List	F4- Header	F5- Format	F6- Sort	F7- Draw	F8- ZOOM
x		y1					
4.		.15308					
5.		.09602					
6.		.06023					
7.		.03778					
8.		.0237					
y1(x) = .060230261882666							



Experiment 2

Due to the results from experiment one and two, these dosages don't work because it is below 6hrs. Therefore, the drugs are ineffective. If the drugs were taken for a longer period of time then it might be safe. If 1.5mg/mL is takes every two hours than the it would be safe and effective.



F1→ Tools	F2→ Zoom	F3→ Trace	F4→ RedPath	F5→ Math	F6→ Draw	F7→ Pen	3/11 10
--------------	-------------	--------------	----------------	-------------	-------------	------------	------------

