Assignment 11

P438 #12

$f(x) = 40.5(2)^{-\frac{x}{12}}$

This function represents a decay process.
The half-life will be a value of x such that

$20.25 = 40.5(2)^{-\frac{x}{12}}$

$0.5 = 2^{-x/12}$

$\ln 0.5 = \frac{-x}{12}\ln 2$

$x = \frac{-12\ln 0.5}{\ln 2} \approx 12$

So, the half-life is 12.

P.438 #14

$f(T) = 770(10)^{T/25}$

This function represents a growth process.
The doubling time will be x such that

$1540 = 770(10)^{T/25}$

$2 = 10^{T/25}$

$\ln 2 = \frac{T}{25}\ln 10$

$T = \frac{25\ln 2}{\ln 10} \approx 7.53$

So, the doubling-time is about 7.53

P438 #64

let t = # of months since August 1

$C(t)$ = T-cell count t months after August 1

t	Data	Ratio
0	800	
		0.925
1	740	
		0.966
2	715	

Our Model: $C(t) = 800(0.95)^t$

We seek t so that

$200 = C(t) = 800(0.95)^t$

By the rule of 72 $t \approx 28$ (months) because decay rate $= 0.05$.

Use my calculator I find $t \approx 27$ (months).

So the patient will reach stage III 27 months after August 1.

P452/46

$P = 11.2e^{0.035T}$

$\ln P = \ln 11.2 + 0.035T$

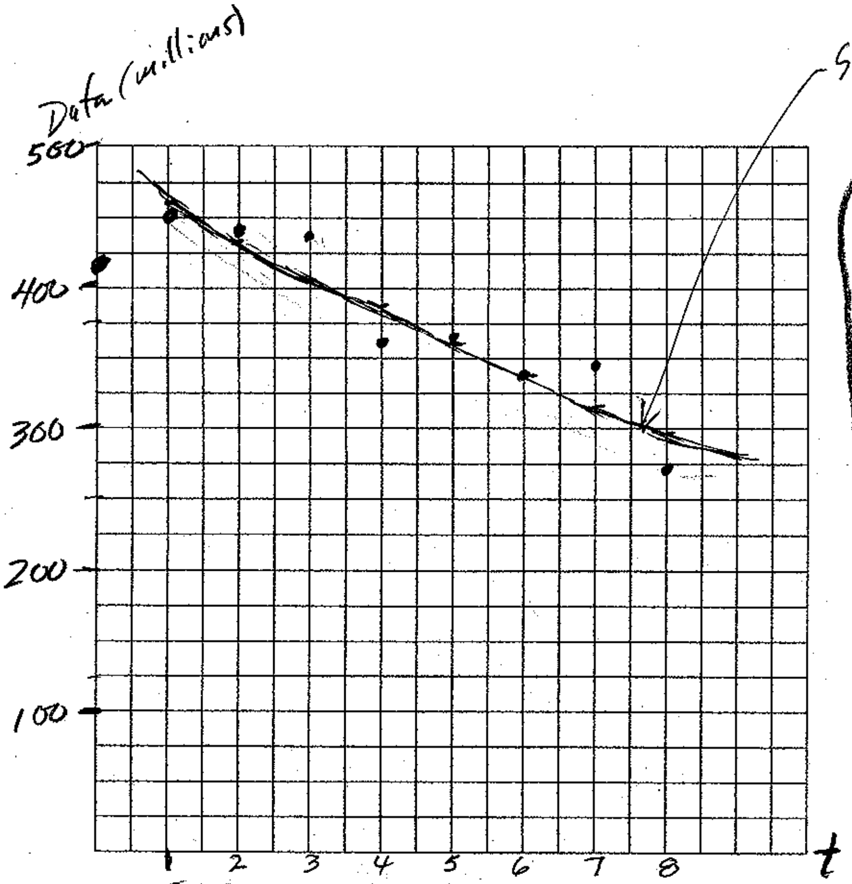
$T = \dfrac{\ln P - \ln 11.2}{0.035}$

P452/#52 See attached graph paper

P473/#2 $(1.15)^{7.4} \approx 2.813$

P473/#4 $150e^{-0.2(18)} \approx 4.099$

p453
#52



a) The graph does not look exponential
b) The ratio test does not suggest that an exponential function will be a good fit to the data.

Let t = years since 1988

c) Try s:
$S(t) = 450(.95)^t$
$S_2(t) = 460(.94)^t$

Year	Years since 1987	Tapes shipped (millions) Data	Ratio	t	$S(t)$	$S_2(t)$
1987	0	410.0				
1988	1	450.1	1.10	0	450	460
1989	2	446.2	0.99	1	427.5	432.4
1990	3	442.2	0.99	2	406.1	406.5
1991	4	360.1	0.81	3	385.8	382.1
1992	5	366.4	1.02	4	366.5	359.1
1993	6	339.5	0.93	5	348.2	337.6
1994	7	345.4	1.04	6	330.8	317.3
1995	8	272.6	0.79	7	314.25	298.3
⋮						⋮
2000						218.9

d) Model S_2 predicts 218.9 million cassette tapes shipped in 2000