1) Pollyanna is going to take out a loan from her bank to buy a car. She wants to pay it back in 4 years and her bank offers her a loan that compounds every month at an APR of 15%.
(a) If Pollyanna can afford to pay $300 per month towards her car, how big of a loan can she afford to take out?

We are given PMT= 300, APR= .15, n = 12, Y = 4, and we need to solve for P.
P = $10, 779.44
(b) If she pays the $300 per month for 4 years, how much does she actually pay for her car?
She pays a total of
$300 × 12 × 4 = $14, 400.

2) Felix is going to take out a loan from his bank to purchase a home. He wants to pay it off in 20 years and his bank offers a loan that compounds every two months at an APR of 12%.
(a) If Felix needs $240, 000 to buy the house, how much will he need to pay every two months toward the loan?
We have that P = 240, 000, APR= .12, n = 6, and Y = 20.

PMT = $5, 291.54.

(b) How much does he actually pay for his house? He pays $5, 291.54 every 2 months for 20 years, so he pays a total of

$5, 291.54 × 6 × 20 = $634, 984.80.

3) Suppose that the number of asteroids in the solar system is decreasing at a rate of 3% per year.
(a) If there are 15 million asteroids in 2007, how many will there be in 2040?
(b) If there are 15 million asteroids in 2007, how many were there in 1998?
(c) How long will it take for the number of asteroids to be cut in half?

(a) Y= 33 A=b*(1 – 0.3)^Y so A= 5.48 million
(b) Y= 9 A = 15 millions so b= A/(.979)= 11.83
(c) T_h= log(1/2)/log(.97)= 22.76

4) Suppose that Andy has a viral infection that just won't go away no matter what he tries, and that the number of viruses doubles every 25 weeks.
(a) If Andy's infection consists of a modest 22 viruses to begin with, how many viruses will he have after 10 days?
(b) If Andy's infection consists of 95 viruses after 10 weeks, how many viruses did he begin with?

(a) T_d=doubling time=175 days t=time A= b * 2(t/T_d) = 22 * 2(10/175) =22.9

(b) t=70 days b= A/(2(70/175)) = 95/(2(70/175)) = 72

5) Suppose a quantity R decays exponentially at a rate of 44% per month.
(a) Compute the approximate half-life in years.
(b) Compute the exact half-life in years.
(c)What percentage of the exact half-life is the approximate half-life?

(a) $T_h \approx 70/44 = 1.59$ months (=0.13 years)
(b) $T_h = \log(1/2)/\log(0.56) = 1.2$ months (= 0.1 years)
(c)1.59/1.2 = 1.41= 132%

6) Some planets in the Star Wars Galaxy have populations that grow or decay exponentially; other planets have populations that increase or decrease linearly; still other planets have populations that do not change linearly or exponentially. For each of the planets in the table below, determine whether their population undergoes exponential change, linear change or neither. (Populations are given in billions and the time is given in years.)

t	Coruscant	Kashyyk
0	500.00	200.00
1	600.00	220.00
2	720.00	242.00
3	864.00	266.20
4	1068.0	292.82

Linear?
C: (600-500)= 100 (720-600)=120 non linear
K: (220-200)=120 (242-220)=122 non linear

Exponential?
C: (720/600) = 1.2 (1068/864) = 1.236 non exponential
K: (220/200) = 1.1 (266.2/242) = 1.1 we must check for all the other values:
200*1.1=220 220*1.1=242 242*1.1=266.2 266.2*1.1 = 292.82 it's exponential!