# Module 8: Real World Applications

1. Population decay

James is studying the decline of a certain bird species. James’ observations are as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | 1900 | 1950 | 1990 | 2005 |
| Population(in thousands) | 6012 | 72 | 2 | .5 |

1. What is the best fit exponential decay equation for this decline?
2. At what year did the population first drop below 1,000,000?
3. If this trend continues, what will be the population in 2020?
4. Compounded interest.

Dominic is comparing savings accounts to deposit $3,000.00 he earned last summer. At First Savings Bank, he can open an account paying 8% annual interest, compounded quarterly. Another option is an account at Blue Sky Credit Union, which pays 7% annually, compounded continuously.

1. Write the accumulation equations for both accounts.
2. What will be the amount in both accounts at the end of two years?
3. Which account will double Dominic’s deposit the soonest?
4. Dosage concentration

The pharmaceutical company NuVex is testing a new stimulant drug to treat chronic fatigue syndrome in humans. NuVex claims the drug will retain a 30% concentration 6 hours after administration of the drug. Independent studies confirm that the dosage concentration, *c*, expressed as percent, will decline according to the following equation: , where t equals the number of hours after the administration of the drug.

1. Is the NuVex claim accurate: will there be a concentration of 30% 6 hours after administration of the drug?
2. What is the concentration of the drug after 5 hours?
3. How many hours must elapse for the concentration to drop below 10 %?