Mr. Gmerek

Calculus

Problem Set 1.3

1. If a principal amount of money, P, is invested for 1 year at a rate, r, compounded annually, the balance, A, is given by 

Prove that if we invest P dollars for n years, the balance can be found by:



* 1. What if the interest is compounded more than once per year? Explain where this comes from.

1. An exponential is of the form, where a > 1.
   1. Find the domain and range and sketch a graph.
   2. Is question number 1 an exponential? If so, identify a and x.
2. Prove the following:
   1. 
   2. 
   3. 
   4. 
   5. 
3. Given the following data, how can you predict the population in 2010 without using a graphing calculator?

World Population

|  |  |
| --- | --- |
| Year | Population  (in millions) |
| 1986 | 4936 |
| 1987 | 5023 |
| 1988 | 5111 |
| 1989 | 5201 |
| 1990 | 5329 |
| 1991 | 5422 |

1. Half-life is the amount of time it takes for half of a substance to decay.
   1. Write a formula to represent this.
   2. The half-life of a certain type of bacteria is 35 days. If there are initially 12 grams of the substance, how long will it take until only 1 gram remains?
2. The formula for exponential growth and decay is.
   1. What restrictions are there on k and a for growth?
   2. What restrictions are there on k and a for decay?
3. Find as x goes to infinity. Do you recognize this number?