

AP Exponential Growth Problems

1993 AB6

Let $P(t)$ represent the number of wolves in a population at time $t > 0$. The population $P(t)$ is increasing at a rate directly proportional to $500 - P(t)$, where the constant of proportionality is k .

1. If $P(0) = 100$, find $P(t)$ in terms of t and k .
2. If $P(2) = 300$, find k .
3. Find $\lim_{t \rightarrow \infty} P(t)$.

1996 AB3

The rate of consumption of cola in the United States is given by $S(t) = C e^{kt}$, where S is measured in billions of gallons per year and t is measured in years from the beginning of 1980.

1. The consumption rate doubles every 5 years and the consumption rate at the beginning of 1980 was 6 billion gallons per year. Find C and k .
2. Find the average rate of consumption of cola over the 10 year period beginning January 1, 1983. Indicate units of measure.
3. Use the trapezoidal rule with four equal subdivisions to estimate $\int_5^7 S(t) dt$.
4. Using correct units, explain the meaning of $\int_5^7 S(t) dt$ in terms of cola consumption.

1993 Multiple Choice #42

A puppy weighs 2.0 pounds at birth and 3.5 pounds two months later. If the weight of the puppy during its first 6 months is increasing at a rate proportional to its weight, then how much will the puppy weigh when it is 3 months old?

- a) 4.2 pounds b) 4.6 pounds c) 4.8 pounds d) 5.6 pounds e) 6.5 pounds