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**Math\_Questions\_0030**

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4. A farmer buys 90 sheep in 1990. In 2005 he has  $x$  sheep, where  $x$  is the last 3 digits of your student id. (Use 317). Assume the population is growing or decaying exponentially.

(a) Find an exponential function  $f(t)=f(0)e^{kt}$  ( $k$  and  $t$  are powers) that models this growth, where  $t$  is the number of years after 1990.

(b) Use this model to predict the size of the population in 2011.

5. Carbon dating is commonly used to determine how old an object is by measuring the amount of carbon-14 that is left in an object as the object decays over the years. This decay proceeds exponentially with half-life of approx 5800 years. How old (to the nearest year) would carbon dating predict a piece of bone is when the amount of carbon-14 has decayed from its original amount of 100g to final amount of 22g ?

NOTE: Radioactive substances decay according to exponential model:

$$A(t) = A(0)e^{(-at)}$$