The Gross Domestic Product (GDP) of the US (in billions of dollars) t years after the year 2000 can be modeled by: $G(t)=9728.69e^{0.065t}$

a) $Find\ G(0)=$

b) $Find\ G(13)=$

The diameter D of a tumor, in millimeters, t days after it is detected is given by: $D(t)=17e^{0.0348t}$

a) The diameter of the tumor when it was originally detected =

b) The days until the diameter of the tumor doubles =

How much money needs to be invested now to obtain \$3500 in 3 years if the interest rate in a savings account is 0.75%, compounded continuously? Round your answer to the nearest cent. $A = Pe^{rt}$

Solve the following equation for t.

$$G = r\left(7 - e^{bt}\right)$$

Assume that each decays according to the formula $A(t)=A_0e^{kt}$ where A_0 is the initial amount of the material and k is the decay constant.

Cobalt-60 has a half-life of 7.222 years. If there is initially 114 grams present, find the following.

(a) The decay constant, k. (four decimal places)

(b) Find a function $A(t)$ for the amount of the isotope, A in grams which remains after time t in years.

(c) Determine the time t in years for 80% of the material to decay. (two decimal places)

Under optimal conditions, the growth of a certain strain of E. Coli is modeled by the **Law of Uninhibited Growth** $N(t)=N_0e^{kt}$ where N_0 is the initial number of bacteria and t is the elapsed time, measured in minutes. The doubling time of this organism is 52 minutes. Suppose 4000 bacteria are present initially.

(a) Find the growth constant k. (four decimal places)

(b) Find a function for the number of bacteria $N(t)$ after t minutes.

(c) How many minutes until there are $26{,}000$ bacteria?

A research technician estimates that a sample of yeast suspension contains 6.5 million organisms per cubic centimeter (cc). Two hours later, she estimates the population density to be 43.5 million organisms per cc. Let *t* be the time elapsed since the first observation, measured in hours. Assume that the yeast growth follows the **Law of Uninhibited Growth** $N(t)=N_0e^{kt}$

a) Find the growth constant *k*. (four decimal places)

b) Find a function which gives the number of yeast (in millions) per cc N(t) after *t* hours.

c) What is the doubling time for this strain of yeast? (2 decimal places.)

The radioactive isotope Erbium-160 has a half-life of 28.6 hours. Find how long it will take for a sample to decay to 21% of its original mass. Round your answer to 2 decimal places.

After planting, a certain tree grows according the model below, with *t* in years and the height *h* in feet.

$$h(t) = 5(12 - 9e^{-0.25t})$$

a. How tall will the tree be in 3 years?

b. After how many years will the tree be 50 feet tall?

c. What is the maximum height of the tree in feet?