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 \( t \).

\[ G = r(7 - e^{bt}) \]
Assume that each decays according to the formula $A(t) = A_0 e^{kt}$ 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 \( N(t) = N_0 e^{kt} \).

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?