Exponential Functions

[1] The exponential function $f(x)$ passes through the points (2,8) and (5,3).

[a] Find and equation for $f(x)$. [b] Find the rate of growth for $f(x)$. [c] Find $f(6)$.

[2] The town of Omri has a current population of $P(0) = 12000$ and its population is growing at 2.3% per year.

[a] Write an equation for $P(t)$, the population at time t. [b] Find $P(3.5)$, the population 3.5 years from now.

[c] In how many years will the population reach 20000?

[3] Vanadium-49 has a half-life of 330 days. Let $m(t)$ be the mass of the material at time t, in days, and let $m(0) = 100g$ be the initial quantity.

[a] Find the (negative) rate of growth for m. [b] Write an equation for $m(t)$. [c] Find the amount of the material left after 365 days. [d] How many days will pass before the quantity drops to 70g?

[4] The number of students at Oldberry High School who have NOT heard a certain rumor is decreasing by 15% every day. Let $P(t)$ be the number of students who have not heard the rumor at time t, in days. $P(0) = 1800$.

[a] Write an equation for $P(t)$. [b] How many students will not have heard the rumor after 5 days?

[c] After how many days will there be only 900 students who have not heard the rumor?

[5] The population of rabbits on Dreary Island is being tracked by wildlife management every month. At time $t = 0$, the population was 1450 rabbits and at time $t = 4$, the population was 1750 rabbits The population is growing exponentially and is given by $P(t)$.

[a] Find an equation for $P(t)$. [b] What is the rate of growth in the rabbit population?

[c] After how many months will the population reach 2900 rabbits?

[6] A 100g sample of Californium-254 decays so that there are 89.2g remaining after 10 days. Let $m(t)$ be the mass of the material at time t, in days.

[a] Write an equation for $m(t)$. [b] After how many days will there be 50.0g remaining?

[c] What is the half0-life of Californium-254?