Exponential Functions

[1] The exponential function $f(x)$ passes through the points $\left(2,\frac{4}{25}\right)$ and $\left(3,-\frac{4}{125}\right)$.

[a] Find and equation for $f(x)$. [b] Find the rate of growth for $f(x)$. [c] Find $f(1)$

[2] 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 $f(6)$.

[3] The exponential function $f(x)$ passes through the points (3,2) and (6,10).

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

[4] The exponential function $f(x)$ passes through the points $\left(-1,\frac{1}{12}\right)$ and $\left(3,\frac{27}{4}\right)$.

[a] Find and equation for $f(x)$. [b] Find the rate of growth for $f(x)$. [c] Express $f(5)$ as a ratio of integers.

[5] 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?

[6] The town of Ballenwhine has a current population of $P(0)=5000$ and its population is declining by 1.5% per year. [a] Write an equation for $P(t)$, the population at time *t*. [b] Find $P(2)$, the population 2 years from now. [c] In how many years will the population decrease to 4000?

[7] The town of Chappinski had a population of 40000 five years ago. Its current population is 45500. [a] Write an equation for $P(t)$, the population at time *t*. [b] Find the annual growth rate of the population. [c] In how many years will the population reach 50000?

[8] 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?

[9] Nobelium-259 has a half-life of 58 minutes. Let $w(t)$ be the mass of the material at time *t*, in minutes, and let $w(0)=4oz$ be the initial quantity.
[a] Find the (negative) rate of growth for *w*. [b] Write an equation for $w(t)$. [c] Find the amount of the material left after 100 minutes. [d] How many hours will pass before the quantity drops to 3 oz?

[10] 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?

[11] 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?

[12] 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 half-life of Californium-254?

[13] A 1.00g sample of Fermium-257 decays so that there are 0.9334g remaining after 10 minutes. Let $m(t)$ be the mass of the material at time *t*, in minutes.

[a] Write an equation for $m(t)$. [b] After how many minutes will there be 0.500g remaining? [c] What is the half-life of Fermium-257?

[14] The half-life of Neptunium-235 is 1.084 years. Start with an initial quantity of 35.6g. Let $m(t)$ be the mass of the material at time *t*, in years.

[a] Write an equation for $m(t)$. [b] After how many years will there be 25.4g remaining?