Section 3.5 Notes: Exponential and Logarithmic Models

Population Formula: $A = Ir^t$

1.) The population of a town in 2015 is 134,000. It has an annual rate of increase of 5.7%.

a.) What is the growth rate? 1.057

b.) Create a formula for the population growth. $A = 134{,}000(1.057)^t$

c.) Based on this growth, what is the expected population in 2020? $A = 134{,}000(1.057)^5 =$

$A = 176{,}799$

2.) The population of a town in 2002 is 78,000. It has an annual rate of decrease of 5.7%.

a.) What is the growth rate? $1 - .057 = .943$

b.) Create a formula for the population growth. $A = 78{,}000(.943)^t$

c.) Based on this growth, what is the expected population in 2020?

$A = 78{,}000(.943)^{18} =$

$A = 27{,}120$

3.) The population of a town in 2005 is 27,500. It has an annual rate of increase of 2.5%.

a.) What is the growth rate? 1.025

b.) Create a formula for the population growth. $A = 27{,}500(1.025)^t$

c.) Based on this growth, what is the expected population in 2025?

$A = 27{,}500(1.025)^{20} =$

$A = 45{,}042$

4.) The population of a town in 2012 is 123,000. It has an annual rate of decrease of 2.7%.

a.) What is the growth rate? $1 - .027 = .973$

b.) Create a formula for the population growth. $A = 123{,}000(.973)^t$

c.) Based on this growth, what is the expected population in 2017?

$A = 123{,}000(.973)^5 =$

$A = 107{,}268$

$F_n = p\left[\frac{(1+i)^n - 1}{i}\right]$ $P_n = p\left[\frac{1-(1+i)^{-n}}{i}\right]$

5. You decide to put away $200 a month into your 401K. You expect to see a 5% return on average. If you plan to retire after 40 years of working, how much will your 401K be worth?

$96,000 Putin

$F_n = 200\left[\frac{\left(1+\frac{.05}{12}\right)^{480}-1}{\left(\frac{.05}{12}\right)}\right] = \$305,204.03$

1526.020156

6. You decide to put away $250 a month into your 401K. You expect to see a 5% return on average. If you plan to retire after 35 years of working, how much will your 401K be worth?

$105,000 Putin

$F_n = 250\left[\frac{\left(1+\frac{.05}{12}\right)^{420}-1}{\left(\frac{.05}{12}\right)}\right] = \$284,023.11$

7. You have found a car for $18,000. The dealership has offered you a 5.5% interest rate for a 6 year loan. What is your monthly payment on your loan?

$18,000 = p\left[\frac{1-\left(1+\frac{.055}{12}\right)^{-72}}{\left(\frac{.055}{12}\right)}\right] = \$294.08$

8. You have found a car for $18,000. The dealership has offered you a 5% interest rate for a 5 year loan. What is your monthly payment on your loan?

$18,000 = p\left[\frac{1-\left(1+\frac{.05}{12}\right)^{-60}}{\left(\frac{.05}{12}\right)}\right] = \$339.68$