Lesson Notes 7-2 Modeling Data Using Exponential Functions

An exponential function of the form $f(x) = a(b)^x$, with $a > 0$, $b > 0$, and $b \neq 1$, models growth when $b > 1$. The y-values increase from left to right along the x-axis.

An exponential function models decay when $a > 0$ and $0 < b < 1$. The y-values decrease from left to right along the x-axis.

An exponential regression function can be determined the same way as a line of best fit was determined last chapter.

Example 1: The population of Manitoba is given for the years from 1951 to 2011.

Year	1951	1961	1971	1981	1991	2001	2011
Pop	776.5	921.7	998.9	1035.5	1109.6	1151.4	1250.6

a) Construct a scatter plot to display the data.

b) Use exponential regression to define a function that models the data.

$y = 0.000845(1.007)^x$

c) Assume the growth rate continues. Estimate the population in 2020.

$y = 0.000845(1.007)^{2020} = 1112.72$

d) Estimate when the population will reach 1 500 000.

3053.09

Example 2: The population of Alberta is given for the years from 2007 to 2011.

Year	2007	2008	2009	2010	2011
Population	3512.7	3591.8	3671.7	3720.9	3779.4

a) Construct a scatter plot to display the data.

b) Use exponential regression to define a function that models the data.

$y = 5.1 \times 10^{-63}(1.02^x)$

c) Assume the growth rate continues. Estimate the population of Alberta in 2020.

120 203.5

d) Estimate when the population will reach 4 200 000.