Lesson Notes 7-5 Modeling Data Using Logarithmic Functions

A logarithmic function may be a good model for a set of data if a scatter plot of the data forms an increasing or decreasing curve in Quadrant I and/or Quadrant IV.

The general form of the logarithmic regression model is y = (constant) + (multiplier)•lnx.

A logarithmic curve of best fit can be used to predict values that are not recorded or plotted. Predictions can be made by reading values from the curve of best fit on a scatter plot or by using the equation of the logarithmic regression function.

Example 1: Determine the equation of the logarithmic regression function that models the given data, and describe these characteristics of it graph:

$0 = 0.04 + 23.87\ln x$ $\quad \ln x = -0.00168$

$-0.04 = 23.87\ln x$ $\quad x = e^{-0.00168}$

$x = 0.998$

- the location of any intercepts

  $x = 0.998$ $y =$ none
- the end behaviour

  IV → I
- the domain and range

  $x > 0$ $\quad y \in \mathbb{R}$
- whether the function is increasing or decreasing

x	2	4	6	8	10	12	14	16	18	20
y	16.6	33.1	42.8	49.7	55.0	59.4	63.0	66.2	69.0	71.6

$y = 0.04 + 23.87\ln x$

Example 2: Jamie earned $4000 in her job after school. The table shows Jamie's balance, to the nearest dollar, over the first 5 years. Use logarithmic regression to determine when the investment will grow to $6000.

Amount x	4000	4168	4343	4525	4716	4914
Time y	0	1	2	3	4	5

$y = -201.5 + 24.3\ln x$

$y = -201.5 + 24.3\ln 6000 = 9.9$