Solving Problems with Polynomials

These notes are intended as a summary of section 1.5 (p. 57 – 60) in your workbook. You should also read the section for more complete explanations and additional examples.

In this section, we will use polynomial functions to model and solve problems.

Example
A certain airline's regulations state that the sum of the length, width, and depth of a piece of carry-on luggage must not exceed 100 cm. Assume that the length must be 10 cm greater than the depth.

a) Write a polynomial function to represent the volume of this luggage.

b) Graph the function (using your graphing calculator).

c) To the nearest cubic centimeter, what is the maximum volume of this luggage?

d) What are the dimensions of the luggage with the maximum volume, to the nearest tenth of a centimeter?

Example 1 (sidebar p. 58)
A piece of cardboard 30 cm long and 25 cm wide is used to make a box with no lid. Equal squares of side length x centimeters are cut from the corners and the sides are folded up.

a) Write a polynomial function to represent the volume, V, of the box in terms of x.

b) Graph the function. What is its domain?

c) To the nearest cubic centimeter, what is the maximum volume of the box? What size of square should be cut out to create a box with this volume? To the nearest tenth of a centimeter, what are the dimensions of the box?

Example 2 (sidebar p. 60)
Clara and 3 friends were born on March 11. Lesley is 5 years younger than Clara. Mike is 2 years younger than Clara. Thomas is 3 years older than Clara. On March 11, 2011, the product of their ages was 61 136 greater than the sum of their ages. How old was Clara and each friend on that day?

Example (not in workbook)
A box in the shape of a rectangular prism has side lengths x, $x + 2$, and $x + 10$. Write a function, $V(x)$, to express the volume of the box in terms of x. Find all possible values of x, given that the volume of the box is 96 cubic centimeters. State the dimensions of the box.

Homework: #3 – 6, 9 – 10 in the exercises (p. 61 – 67). Answers on p. 68.