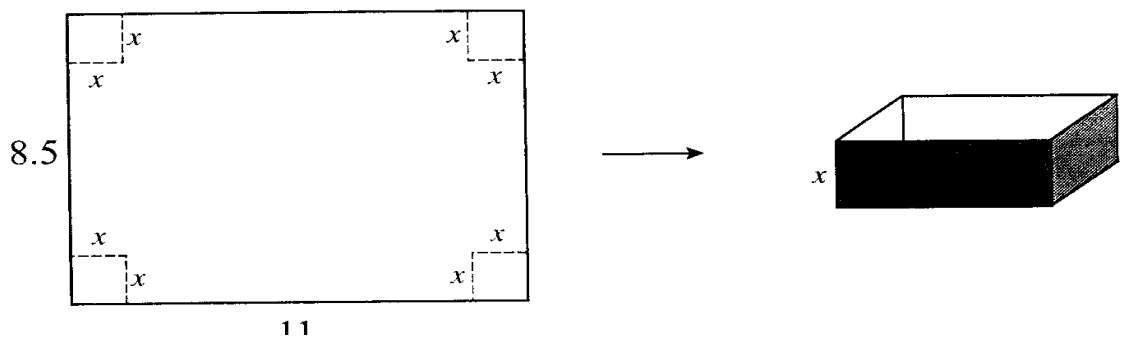
Math 104Q
University of Connecticut

Group Work on Polynomials: The Largest Box

A standard notepad page measures 8.5" x 11". You are going to construct the largest possible box out of the cardboard backing of a notepad. Ready? Cut out identical squares of side length x from each corner, and fold up the sides, like in the drawing below.



a. Write each side of the box as an expression in x.

b. Express the volume of the box as a function of x. Call it $y = V(x)$.

c. What is the domain of $V(x)$?

d. Calculate the following values of $V(x)$, and use them to graph the function $y = V(x)$ on a separate sheet of paper.

V(0) =	V(1) =	V(1.5) =
V(2) =	V(2.5) =	V(3) =
V(4) =	V(4.25) =	

e. Use the graph to estimate the largest possible volume of your box. For what x are you going to obtain this largest box?

Largest Volume =
Obtained at: x =

f. Use the graph to find the range of $V(x)$.

Range of $V(x)$ is:

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Solution to: The Largest Box

a. $8.5 - 2x$; $11 - 2x$; and x

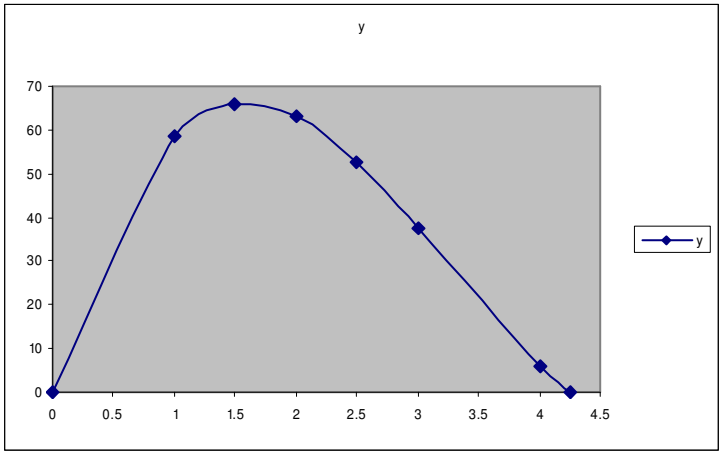
b. $V(x) = (8.5 - 2x)(11 - 2x)x = 4x^3 - 39x^2 + 93.5x$

c. All numbers x satisfying $0 \le x \le 8.5/2 = 4.25$

d.

V(0) = 0	V(1) = 58.5	V(1.5) = 66
V(2) = 63	V(2.5) = 52.5	V(3) = 37.5
V(4) = 6	V(4.25) = 0	

e.



Largest Volume = 66"
Obtained at: x = 1.5"

f. All numbers y satisfying $0 \le y \le 66$