1.7 Modeling w/ Functions

Pólya's Four Problem-Solving Steps

#1 Understand the problem

#2 Devise a plan

#3 Carry out the plan

#4 Look back

(#1) Identify the given information
Identify your goal.
How are the two related?

(#2) How might the problem be represented?
Numerically, algebraically or graphically?
Will these representations give you additional information?
What additional resources might you need?
How will you get to the conclusion?

(#3) Perform the analysis, algebra, approximation etc.

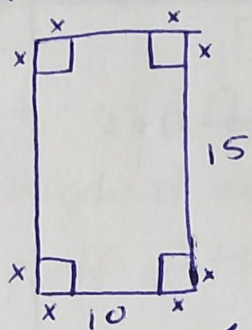
(#4) Is your conclusion reasonable? how do you know?

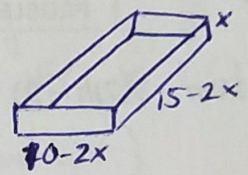
EX#1 A 10-in by 15-in paper is cut so that squares of length x are removed from all 4 corners and then folded to create an open-topped box.
What is the domain of the volume function and when is it at its maximum?

$V = lwh$

$V = (15-2x)(10-2x)x$

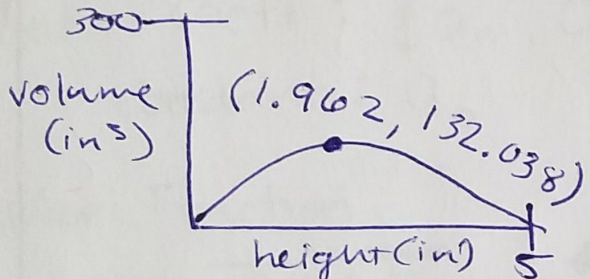
Domain: $(0, 5)$





$10 - 2x \leq 0$

$x = 5$



The maximum volume of the open-topped box is $132.038\ in^3$.

EX#2 Option A offers a starting salary of $60,000 plus 6% of any sales made. Option B offers $58,000 plus 9% of any sales.
Up to what point is option A better?

Given
start $60,000 plus 6%
start $58,000 plus 9%

Don't know
at what pt they're the same
how much is sold

$O_A = 60{,}000 + .06x$

$O_B = 58{,}000 + .09x$

x = $ in sales
O_A = total salary for option A
O_B = total salary for option B

we will set $O_A = O_B$ to determine when both options give the same salary.

$60{,}000 + 0.06x = 58{,}000 + 0.09x$

$2000 = 0.03x$

$x = \$66{,}666.66$

Option A is better for sales between $0 & $66,666.66