Written assignments to hand in.

Discussion Problems
From the department syllabus
These are not to hand in.

Section 3.1

32, 34

due Tuesday 11/7

Section 3.1, Page 273 focus on modeling.

at the end of Chapter 2 in the ebook.

WebAssign

3.1 + 3.2 Friday 11/10 9 pm.

Focus on modeling

64 in sec 3.1 22 Focus on modeling at the end of chapter 2

due Wednesday 11/8

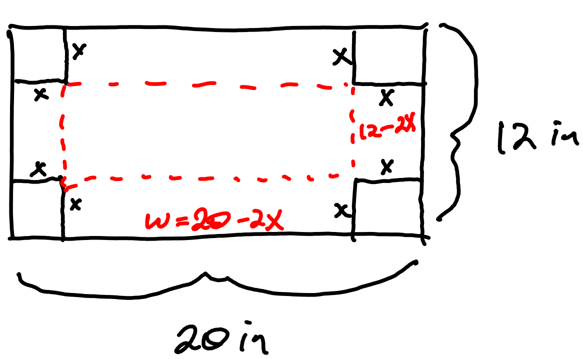
Section 3.2

26, 38

due Friday 11/10

Modelling with quadratic Functions

(26) End of Chapter 2



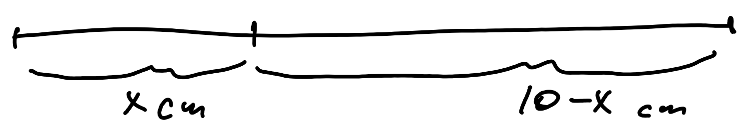
Cut out corner squares and fold into an open-top box.

(a) Find a cubic function which models the volume of the box $V(x)$.

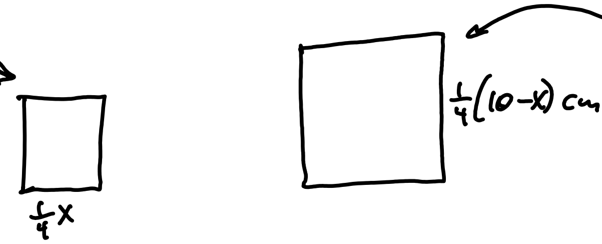
Volume = length · width · height

$$\boxed{V(x) = (20-2x)(12-2x)x} \text{ inches}^3.$$

(24) A 10 cm long piece of wire is cut into two pieces



The two pieces are bent into 2 squares.



$\boxed{\text{Area} = \left(\frac{1}{4}x\right)^2 = \frac{1}{16}x^2}$

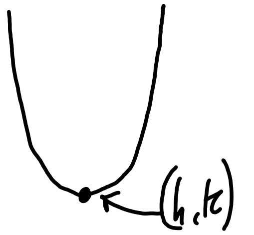
$\boxed{\text{Area} = \left(\frac{1}{4}(10-x)\right)^2 = \frac{1}{16}(10-x)^2}$

a. Find a quadratic function $A(x)$ measuring the sum of the areas of the two squares.

b. Find the value of x which yields minimum total area enclosed by the squares.

$$A(x) = \frac{1}{16}x^2 + \frac{1}{16}(10-x)^2 = \frac{1}{16}x^2 + \frac{1}{16}(x^2-20x+100) = \boxed{\frac{1}{8}x^2 - \frac{5}{4}x + \frac{25}{4} \text{ cm}^2}$$

6.



k is the minimum value of $A(x)$ occurring at h.

Where $A(x) = ax^2+bx+c$ has $h = \frac{-b}{2a}$ $k = A\left(\frac{-b}{2a}\right)$

$$h = \frac{-\left(-\frac{5}{4}\right)}{2\left(\frac{1}{8}\right)} = \frac{\frac{5}{4}}{\frac{1}{4}} = 5$$

$$k = A(5) = \frac{1}{8}5^2 - \frac{5}{4}(5) + \frac{25}{4} = \frac{25}{8} - \cancel{\frac{25}{4}} + \cancel{\frac{25}{4}} = \boxed{\frac{25}{8}\ cm^2}$$

minimum area.

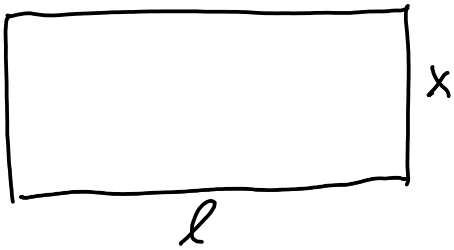
3.1 #63

2400 ft of fencing will be made into a rectangular pen.

(a) find a quadratic function $A(x)$ which models the area of the pen.

(b) what is the max possible area of the pen.

a.



Area $= xl$

To write l in terms of x we use

$$2x + 2l = 2400$$

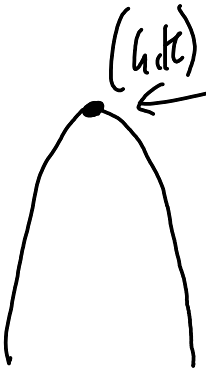
$$2l = 2400 - 2x$$

$$\boxed{l = 1200 - x}$$

$$A(x) = x(1200 - x)$$

$$\boxed{\begin{array}{l} A(x) = 1200x - x^2 \\ A(x) = -x^2 + 1200x \end{array}}$$

b.



max value

$$k = A\left(\frac{-b}{2a}\right)$$

$$h = \frac{-b}{2a}$$

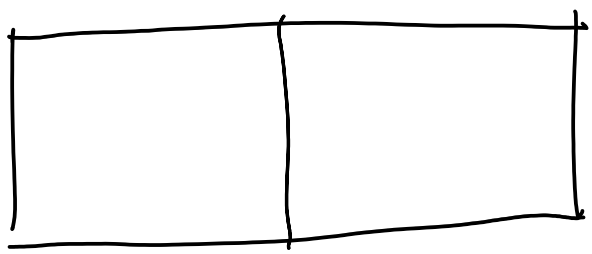
$$h = \frac{-(1200)}{2(-1)} = 600 \text{ (square pen)}$$

$$A(600) = -(600)^2 + 1200(600)$$

$$\boxed{= 360{,}000 \text{ ft}^2}$$

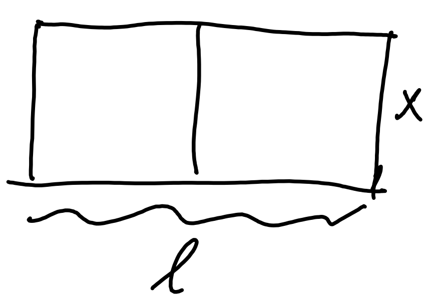
Similar example

2400 ft of fencing is used to make a pen in the following shape.



a. find quadratic function $A(x)$ for the area of the pen.

b. Find max area that can be enclosed.



$$\text{Area} = xl$$

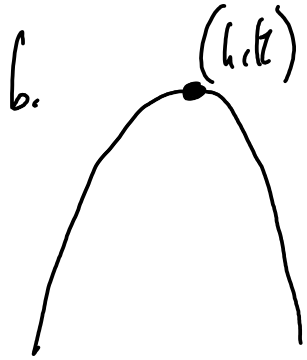
$$2l + 3x = 2400$$

$$2l = 2400 - 3x$$

$$l = 1200 - \tfrac{3}{2}x$$

$$\text{Area } \boxed{A(x) = x\left(1200 - \tfrac{3}{2}x\right) = -\tfrac{3}{2}x^2 + 1200x}$$

6.



$$h = \frac{-1200}{2\left(-\frac{3}{2}\right)} = \frac{1200}{3} = 400$$

$$A(400) = -\frac{3}{2}(400)^2 + 1200(400)$$

$$= -\frac{3}{2}(160{,}000) + 480{,}000$$

$$= -240{,}000 + 480{,}000$$

$$\boxed{= 240{,}000 \text{ ft}^2}$$

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