

2.6: Modeling w/ Functions

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Ex 1: Fed Ex wants to produce an open box w/ a square base. The surface area of the box must be 1000 in^2 .

a) Find a function that models the height of the box as a function of the width.

Ex 2: Coca Cola is redesigning their aluminum cans. Each can has 360 ml (12 fl oz). The top & bottom cost 3 times more than the sides. What dimension should the new coke can be to minimize cost?

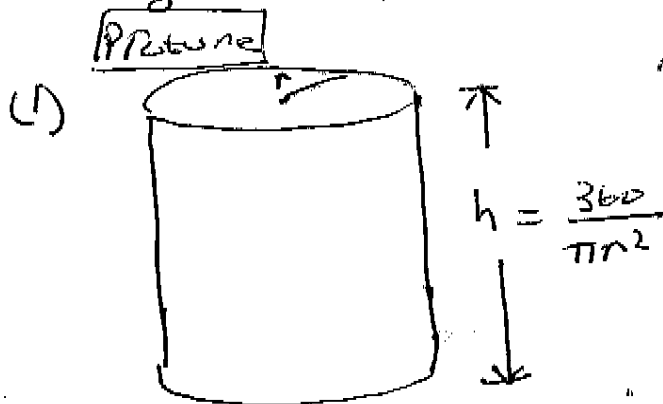
Ex 3: If I want to fence a rectangular region up against a river (no fence along the river), and I have 300 ft of fencing, what are the dimensions of the region w/ the greatest possible area.

The Strategy

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- (1) Draw a picture & define variables.
- (2) Set up a fct.
- (3) Use the fct to answer the question, e.g., maximize or minimize.
- (4) Express your answer in words.

using example 2.



$$360 = \pi r^2 h \Rightarrow h = \frac{360}{\pi r^2}$$

(2) FUNCTIONS

$$C(r) = \begin{array}{c} \text{cost} \\ \text{top} \end{array} + \begin{array}{c} \text{cost} \\ \text{side} \end{array} + \begin{array}{c} \text{cost} \\ \text{bottom} \end{array}$$

$$\Rightarrow C(r) = 3\pi r^2 + 1.2\pi r \left(\frac{360}{\pi r^2} \right) + 3\pi r^2$$

$$\Rightarrow C(r) = 6\pi r^2 + \frac{720}{r}$$

(3) Minimize

by graphing @ $r \approx 2.67 \text{ cm}$

(4) Conclusion

The cost of the can is minimized when its radius is about 2.67 cm & height 16.09 cm