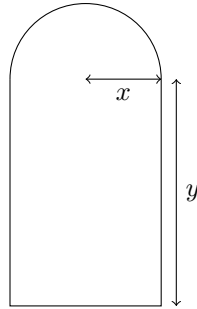


1. a) Find the absolute extrema of  $f(x) = x^3 - 6x^2 + 9x$  over the domain  $[0, 5]$ .  
b) Find the absolute extrema of  $g(x) = 2x^3 - 12x^2 + 18x + 10$  over the domain  $[0, 5]$  (try to do this without differentiating).

2. By cutting away identical squares from each corner of a rectangular piece of cardboard and folding up the resulting flaps an open box may be made. If the cardboard is 15 in. long and 8 in. wide, find the dimensions of the box that will yield the maximum volume.

3. A Norman window has the shape of a rectangle surmounted by a semicircle. If a Norman window is to have a perimeter of 28 ft., what dimensions will maximize the area of the window?



4. World population is forecast to be

$$P(t) = 0.00074t^3 - 0.0704t^2 + 0.89t + 6.04 \quad (0 \leq t \leq 4)$$

where  $t$  is measured in decades after 2000 and  $P(t)$  is measured in billions. When will population peak according to this model?