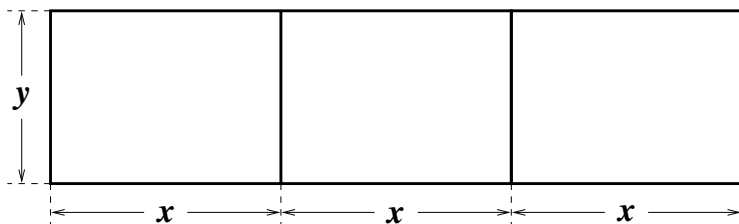


1. Sketch a plausible graph of a polynomial  $f(x)$  on the interval  $[-20, 20]$  given the following information about the first and second derivatives of  $f(x)$ .

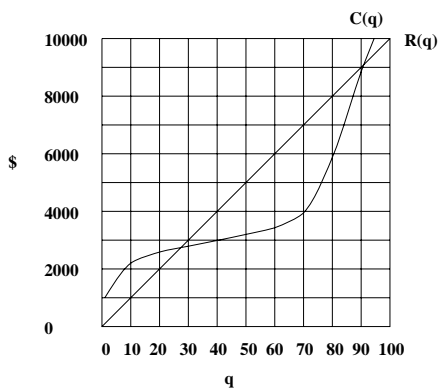
- $f'(x) = 4x(x + 15)(x - 9)$
- $f''(x) = 12(x + 9)(x - 5)$

2. Without using a calculator, find the absolute maximum and minimum values of  $f(x) = 2x^3 + 3x^2 - 12x$  on the interval  $[0, 2]$ .

3. A farmer wishes to fence off three identical adjoining rectangular pens as in the diagram shown. Determine the maximum total area that can be enclosed by these three pens if he only has 240 linear feet of fencing available? Your answer should include the  $x$  and  $y$  values which give this maximum area.



4. The cost and revenue functions for the Little Genius Kindergarten Chemistry Set Company are graphed below.



- (a) At a production level of 80 chemistry sets, which is greater — the marginal revenue or the marginal cost?
- (b) If current production is at 50 sets, should the company increase production to 51 sets? Explain.
- (c) If current production is at 20 sets, should the company increase production to 21 sets? Explain.
- (d) How many chemistry sets are produced and sold when the company attains its maximum profit? What is the dollar amount of this profit?
- (e) There are two different values for  $q$  where the marginal revenue is equal to the marginal cost. Use the graph to approximate these values of  $q$ . Explain why the company cares about each of these values of  $q$ .