Example

Let $f(x) = x^3 + 6x^2 - 15x + 1$.

Find the intervals in which f is increasing or decreasing.

Locate all points where the tangent line is horizontal.

Sketch a graph of $y = f(x)$.

Example

A company selling Foxtrot fireplaces finds that the cost per fireplace decreases linearly with the number of monthly sales. When no fireplaces are sold, the cost per fireplace is \$1000. When 1000 fireplaces are sold, the cost per fireplace is \$700.

The company knows that the revenue for selling x fireplaces is

$$R(x) = \frac{1}{1000}x^3 + \frac{9}{10}x^2 + 1190x.$$

Determine the sales level(s) that give an increasing profit.

Example

Find the critical numbers and decide where f is increasing and decreasing if

$$f(x) = (x-1)^{2/3}$$

Example

Let f be a parabola that opens up, in other words,

$$f(x) = ax^2 + bx + c, \qquad a > 0.$$

Using calculus, find the vertex of the parabola as well as the intervals where the parabola is increasing and decreasing.