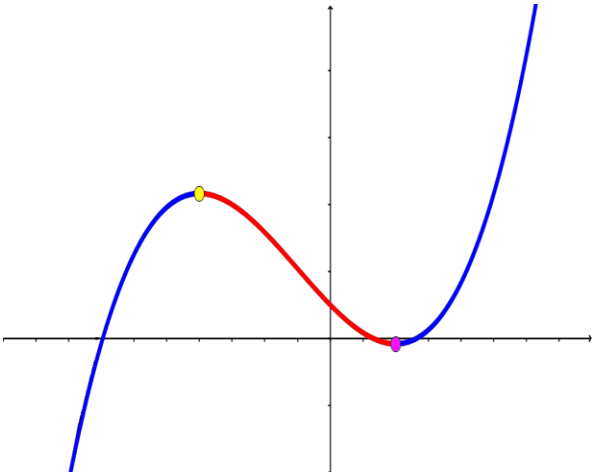
Local Maxima and Minima

Recall: We say that a function, $y = f(x)$, is increasing if

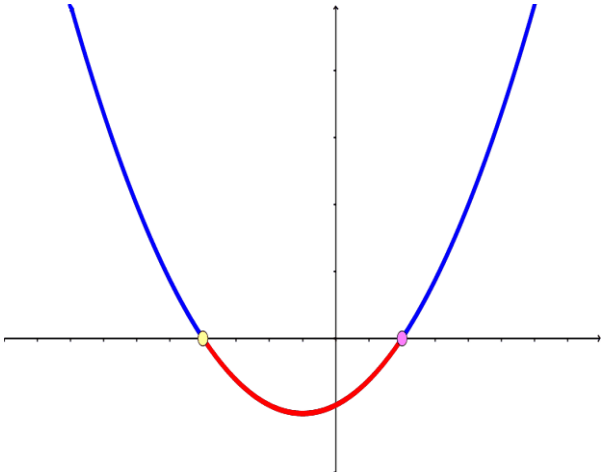
We say that a function, $y = f(x)$, is decreasing if

We say that a function, $y = f(x)$, is constant if

f(x)



f '(x)



Definition: We say that $f(x)$ has a local minimum at $x = c$ if

Definition: We say that $f(x)$ has a local maximum at $x = c$ if

Definition: We say $f(x)$ has a critical point at $x = c$ if

First Derivative Test:

If $f'(c) = 0$ then:

$f(x)$ has a local max ; $f'(x) = 0$ and $f(x)$ is concave

$f(x)$ has a local min ; $f'(x) = 0$ and $f(x)$ is concave

Second Derivative Test:

If $f'(c) = 0$ then:

Example: Find all critical points of $f(x) = x^3 + 3x^2 + 24x - 12$ and classify them as local max, local min, or neither.

Warning Ex: Find and classify all critical points of $f(x) = x^3$