4.2 Mean Value Theorem

MVT - Mean Value Theorem

If f(x) is continuous on [a,b] and it is differentiable on (a,b), then there is some point c at which,

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

Ex 1) Find a point c that satisfies the Mean Value Theorem given the following:

$$y = x^2 \qquad 0 \le x \le 4$$

Ex 2) Find a point c that satisfies the Mean Value Theorem given the following:

$y = \sqrt{x} \quad 0 \le x \le 4$

Ex 3) Find a point c that satisfies the Mean Value Theorem.

$y = \ln x \quad 1 \le x \le e$

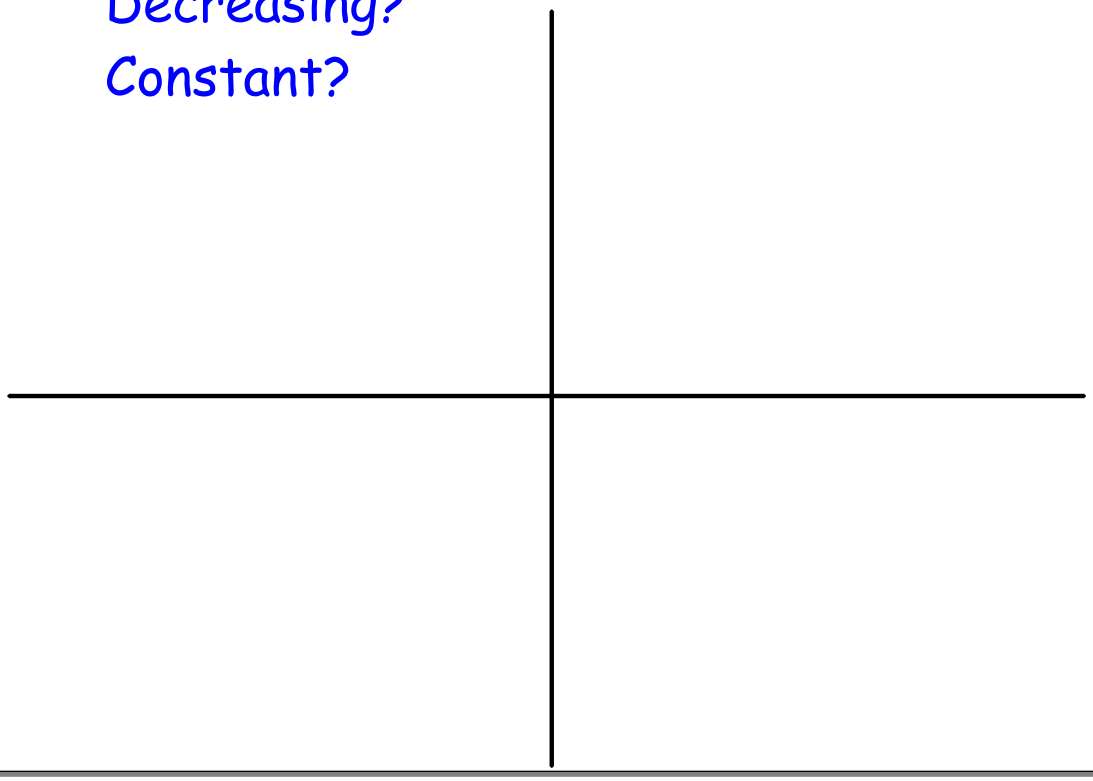
Ex 4) Find a point c that satisfies the Mean Value Theorem.

$y = |x| \qquad -2 \le x \le 2$

Ex 5) Find a point c that satisfies the Mean Value Theorem.

$y = x^{3/2} \qquad 1 \le x \le 4$

Ex 6) Increasing?
Decreasing?
Constant?



Assuming f(x) is continuous and differentiable on [a,b]...

If $f'(x)>0$ for all x on (a,b), then f(x) is increasing on [a,b]

If $f'(x)<0$ for all x on (a,b), then f(x) is decreasing on [a,b]

***A function can be both increasing and decreasing at the same point!

Ex 7) Determine the intervals on which the function is increasing or decreasing.

$f(x) = (x-3)^3$

Ex 8) Determine the intervals on which the function is increasing or decreasing.

$f(x) = x^4 - 2x^2$

Ex 9) Determine the intervals on which the function is increasing or decreasing.

$$f'(x) = \frac{5x-10}{3\sqrt{x}}$$