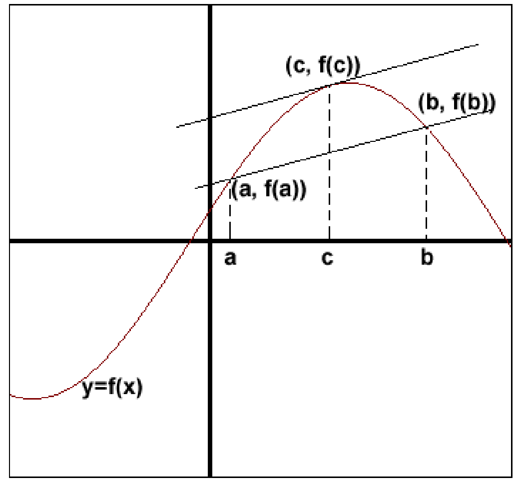
4.2 The Mean Value Theorem

Looking at the picture to the right I can find two points such that the slope of the line going through these two points is the same as the slope of a line going through point x. This is called the



Mean Value Theorem

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

In order for the Mean Value Theorem to be applied:

1.) *f* must be continuous on [a, b].

2.) *f* must be differentiable on (a, b).

If the above two conditions are met, then c must be on (a, b).

EXAMPLE: Determine whether the Mean Value Theorem can be applied to $f(x) = x^{\frac{4}{5}}$ on [0, 1].

EXAMPLE: Determine whether the Mean Value Theorem can be applied to $f(x) = x(x^2 - x - 2)$ on [-1, 1]. If yes, then find all values of c on (a, b) such that $f'(c) = \dfrac{f(b) - f(a)}{b - a}$.

EXAMPLE: Determine whether the Mean Value Theorem can be applied to $f(x) = \ln(x-1)$ on [2, 4]. If yes, then find all values of c on (a, b) such that $f'(c) = \dfrac{f(b)-f(a)}{b-a}$.

EXAMPLE: Determine whether the Mean Value Theorem can be applied to $f(x) = 2\sin x + \sin 2x$ on $[0, \ \pi]$. If yes, then find all values of c on (a, b) such that $f'(c) = \dfrac{f(b)-f(a)}{b-a}$.

EXAMPLE: Determine whether the Mean Value Theorem can be applied to $f(x)=\sqrt{x(1-x)}$ on [0, 1]. If yes, then find all values of c on (a, b) such that $f'(c)=\dfrac{f(b)-f(a)}{b-a}$.