

Bell Work


Find the $g'(x)$ given $g(x)$

$$g(x) = 4x^2 - 12x + 20$$



PRE-CALC TRIG

Day 73



12.3 The Tangent Line Problem

(From last time...)

Definition of Derivative

The derivative of f at x is given by

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \quad \text{provided this limit exists.}$$

Example:

Find the derivative and use it to identify the slope of the tangent through the given point.

(Use the alternative way we learned today)

$$f(x) = 3x^2 - 6x \quad (2, 0)$$

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$$f'(x) = \lim_{h \rightarrow 0} \frac{[3(x + h)^2 - 6(x + h)] - [3x^2 - 6x]}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} = \frac{3x^2 + 6xh + 3h^2 - 6x - 6h - 3x^2 + 6x}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} = \frac{6xh + 3h^2 - 6h}{h} = \frac{h(6x + 3h - 6)}{h}$$

$$f'(x) = \lim_{h \rightarrow 0} 6x + 3h - 6 = \mathbf{6x - 6}$$

Solution

Since the derivative is $6x-6$...

Therefore the slope of the tangent through $(2,0)$ is at

$$f'(2) = 6(2) - 6 \dots$$

$$f'(2) = 6$$

Graph to see.

Could we find the equation of the line (not just the slope) through the point $(2,0)$?

What if we wanted to find the slope through the point $(3,9)$?

Another way to find the derivative...

- For each term, multiply the exponent of each variable with it's coefficient (creating a new coefficient) and subtract one from the given exponent

$$f(x) = 3x^2 - 6x \quad (2, 0)$$

$$f'(x) = (2)3x^{2-1} - (1)6x^{1-1}$$

$$\mathbf{f'(x) = 6x - 6}$$

Slope of tangent at the point...

$$\text{So } f'(2) = 6(2) - 6 \rightarrow f'(2) = 6$$

Do you like this process better than....

From last time...

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Another Example: Find Derivative. Find the slope of the tangent at the given point. Write the equation of the line through the given point.

$$y = 2x^3 - 5x^2 + 3 \qquad (0.5, 1.5)$$

For next time...

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