Bell Work

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

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

PRE-CALC TRIG

Day 20

<u>12.3 The Tangent Line Problem</u>
(From last time…)

<u>Definition of Derivative</u>

The derivative of f at x is given by

$$f'(\mathbf{x}) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$ 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)

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

$$\underline{f(x) = 3x^2 - 6x \qquad (2,0)}$$

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

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

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

$$f'(\mathrm{x}) = \lim_{h \to 0} 6x + 3h - 6 \quad = \quad \boldsymbol{6x - 6}$$

Solution

Since the derivative is 6x-6…

Therefore the slope of the tangent through (2,0) is at f'(2)=6(2) – 6 …

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)?

From last time…

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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

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

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

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

Slope of tangent at the point…

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

Do you like this process better than….

For next time…

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