Tonights HW: After Quiz + Packet p 6 every other odd + Packet p 3 ~~Evens~~ odds

Warm Up (Quiz Day)

a) Find the equation of the line tangent to $y = 2x^3 + 4x^2 + x$ at $x = 2$

$y(2) = 2(2)^3 + 4(2)^2 + 2 = 34$

$y - 34 = 41(x - 2)$

$y' = 6x^2 + 8x + 1$

$y'(2) = 6(2)^2 + 8(2) + 1 = 41$

$24 + 16 + 1$

b) Find the equation of the line tangent to $y = -4x^2 - 6x + 2$ at $x = 3$

$y(3) = -4(3)^2 - 6(3) + 2$

$-36 - 18 + 2 = -52$

$y' = -8x - 6$

$y + 52 = -30(x - 3)$

$y'(3) = -8(3) - 6$

$y'(3) = -30$

c) Use the limit definition to find the derivative of $f(x) = \frac{2}{x-3}$ and $g(x) = \sqrt{x-3}$

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

$\lim_{h\to 0} \frac{\frac{2}{x+h-3} - \frac{2}{x-3}}{h}$

$\Rightarrow \lim_{h\to 0} \frac{1}{h}\left(\frac{2(x-3) - 2(x+h-3)}{(x+h-3)(x-3)}\right)$

$\lim_{h\to 0} \frac{1}{h} \frac{2x - 6 - 2x - 2h + 6}{(x+h-3)(x-3)} = \lim_{h\to 0} \frac{-2h}{h(x+h-3)(x-3)}$

$\frac{-2}{(x-3)^2} = f'(x)$

$\lim_{h\to 0} \frac{\sqrt{x+h-3} - \sqrt{x-3}}{h}$

$\lim_{h\to 0} \frac{(\sqrt{x+h-3} - \sqrt{x-3})(\sqrt{x+h-3} + \sqrt{x-3})}{h(\sqrt{x+h-3} + \sqrt{x-3})}$

$\lim_{h\to 0} \frac{(x+h-3) - (x-3)}{h(\sqrt{x+h-3} + \sqrt{x-3})}$

$\lim_{h\to 0} \frac{h}{h(\sqrt{x+h-3} + \sqrt{x-3})}$

$g'(x) = \frac{1}{2\sqrt{x-3}}$

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Warm Up (Quiz Day) ANSWERS

a) Find the equation of the line tangent to $y = 2x^3 + 4x^2 + x$ at $x = 2$ $\quad y - 34 = 41(x - 2)$

$y = 41x - 48$

b) Find the equation of the line tangent to $y = -4x^2 - 6x + 2$ at $x = 3$ $\quad y + 52 = -30(x - 3)$

$y = -30x + 38$

c) Use the limit definition to find the derivative of $f(x) = \frac{2}{x-3}$ and $g(x) = \sqrt{x-3}$

$f'(x) = \frac{-2}{x^2 - 6x + 9}$ $\qquad g'(x) = \frac{1}{2\sqrt{x-3}}$

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Unit 5
Whiteboard Quiz Review

Derivatives

What is the limit definition of a derivative?

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

Find the derivative using the **limit definition** of derivatives.

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

$$f'(x) = 2$$

Find the derivative using the **power rule**. Write your answer with positive, whole exponents or radicals.

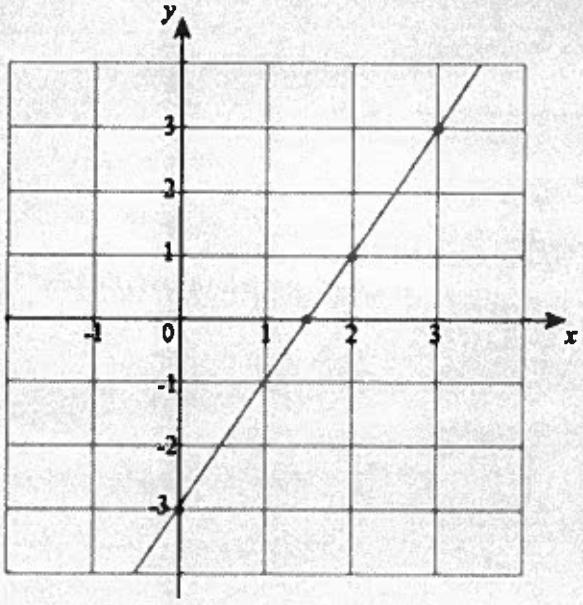
$$f(x) = 4x^4 - 5x + 2\sqrt{x} - 3$$

$$f'(x) = 16x^3 - 5 + \frac{1}{\sqrt{x}}$$

Find the slope of the function $y = -x^2 - 12\sqrt{x} - 5$ at x = 9.

$m = -20$

Find the derivative of the function.



$y' = 2$

Find the derivative using the **limit definition** of derivatives.

$$g(x) = x^2 - 5x + 6$$

$$g'(x) = 2x - 5$$

Find the derivative using the **power rule**. Write answers with positive, whole exponents or radicals.

$$f(x) = -\frac{4}{x^5} + \frac{2}{x^3} + \sqrt[3]{x^5}$$

$$f'(x) = \frac{20}{x^6} - \frac{6}{x^4} + \frac{5\sqrt[3]{x^2}}{3}$$

Find the equation of the line tangent to $y = x^3 - 3x^2 + 2$ point at (3, 2).

$y' = 3x^2 - 6x$

$y'(3) = 3(3)^2 - 6(3)$

$= 27 - 18$

$m = 9$

$y - 2 = 9(x - 3)$ Point Slope

or $y = 9x - 25$ Slope Intercept

Find the slope intercept equation of the tangent line of when x = 2

$g(x) = 5x^2 - 3x + 7$

$g'(x) = 10x - 3$

$g'(2) = 10(2) - 3 = 17$

$g(2) = 5(2)^2 - 3(2) + 7 = 21$

$y - 21 = 17(x - 2)$

$y = 17x - 34 + 21$

$y = 17x - 13$

Find the derivative using the **limit definition** of derivatives.

$$h(x) = \sqrt{2+x}$$

$$h'(x) = \frac{1}{2\sqrt{x+2}}$$

Find the equation of the line tangent to $y = x^3 - 2x^2 + 2$ point at (2, 2).

$$y - 2 = 4(x - 2)$$

$$or \quad y = 4x - 6$$

Find the derivative using the **limit definition** of derivatives.

$$h(x)=\frac{2}{x+3}$$

$$h'(x)=\frac{-2}{x^2+6x+9}=\frac{-2}{(x+3)^2}$$

Find the derivative using the **power rule**.

$$f(x)=x^{\frac{2}{3}}$$

$$f'(x)=\frac{2}{3x^{\frac{1}{3}}} \quad OR \quad \frac{2}{3\sqrt[3]{x}}$$

Find the derivative of the function $y = -x^3 + 3x^2 + 3$ at x = -1.

$f'(x) = -9$

Find the derivative using the **power rule.**

$$g(x) = -\frac{1}{2}x^4 + 3x^{\frac{5}{3}} + 2x$$

-1

$+3\cdot\frac{5}{3}x^{2/3}$

$+5x^{2/3}$

Express your answer with positive whole exponents and radicals.

$$g'(x) = -2x^3 + 5x^{\frac{2}{3}} + 2$$

$g'(x) = -2x^3 + 5\sqrt[3]{x^2} + 2$

MATHO

Homework

- Finish MATHO Packet p. 6
- Quiz Review sheet
- Study for Quiz!