Derivative Rule Quiz 1

Name: ______________________________ Date: October 24, 2019

Thinking Strategies	Communication	Modelling & Solving

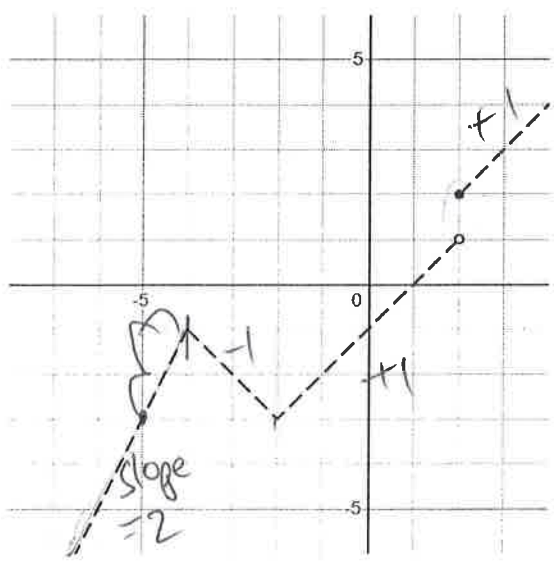
1. Use the definition of the derivative to find $f'(x)$ given $f(x) = 3 + \sqrt{2x}$

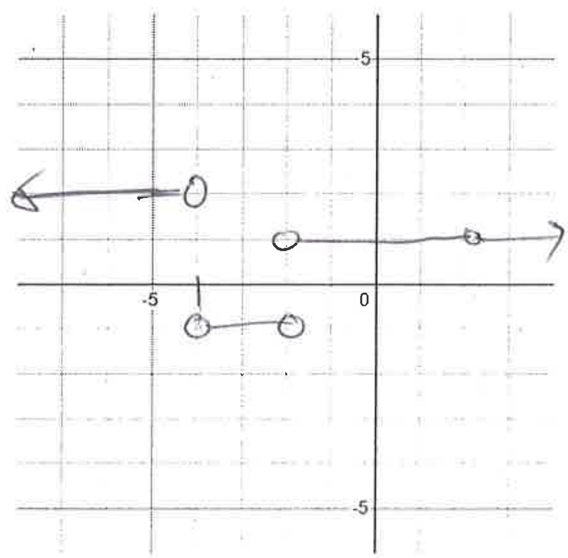
$$\lim_{h\to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h\to 0} \frac{\cancel{3} + \sqrt{2(x+h)} - \cancel{3} - \sqrt{2x}}{h}$$

$$= \lim_{h\to 0} \frac{\sqrt{2(x+h)} - \sqrt{2x}}{h} \cdot \frac{\sqrt{2(x+h)} + \sqrt{2x}}{''}$$

$$= \lim_{h\to 0} \frac{\cancel{2x} + 2\cancel{h} - \cancel{2x}}{\cancel{h}\left(\sqrt{2(x+h)} + \sqrt{2x}\right)} = \frac{\cancel{2}}{\cancel{2}\sqrt{2x}}$$

2. Given the graph of g below, graph the derivative g'





3. Determine the equation of the tangent line at $x = 1$ given that $y = 3x^4 - \frac{5}{x^3} + 4\sqrt{x}$

$$y' = 12x^3 + \frac{15}{x^4} + \frac{2}{\sqrt{x}}$$

$$y(1) = 3 - 5 + 4 = 2$$

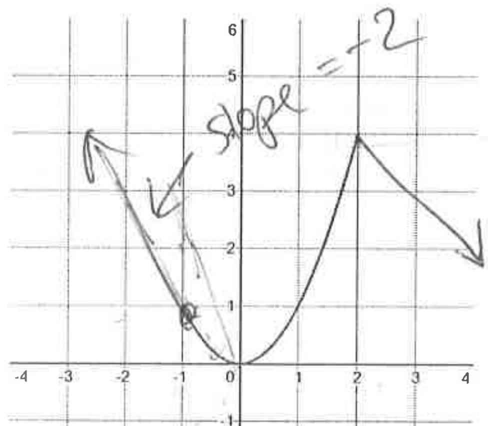
$$y'(1) = 12 + 15 + 2 = 29$$

$$y = 29(x-1) + 2$$

4. What does it mean for a function to be differentiable at a point? Fill in the piecewise function with two lines so that h is differentiable at $x = -1$, but NOT at $x = 2$. Keep h continuous!

$$h(x) = \begin{cases} \boxed{-2x - 1} & x < -1 \\ x^2 & -1 \le x \le 2 \\ -x + 6 & x > 2 \end{cases}$$

The derivative exists @ the point (same slope on both sides)



@ $x = -1$ slope is $2x$ @ $x = -1$

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