Definition of the derivative

Tuesday, September 25, 2012

Names and student numbers for group (minimum of 2):

1. ____________________________________

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2. ____________________________________

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3. ____________________________________

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① Use $f(x) = \sqrt{x} + 1$ in computing the derivative below.

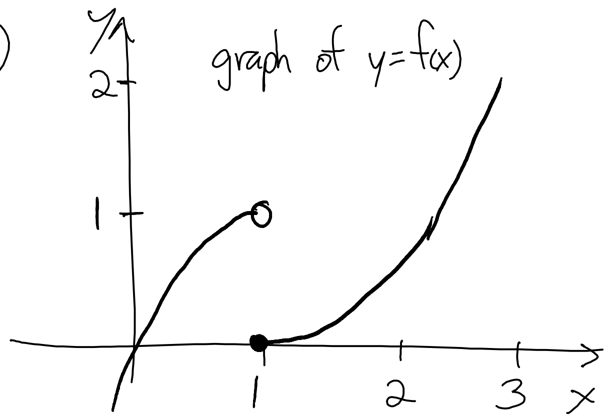
$$f'(a) = \lim_{x \to a} \frac{f(x) - f(a)}{x - a}$$

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

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

Write two different limit expressions for $f'(1)$. Which would you prefer to use to compute $f'(1)$?

(2)



a) Draw the secant from $(1, f(1))$ to $(0.8, f(0.8))$ and the secant from $(1, f(1))$ to $(1.5, f(1.5))$.

b) On the left we have $\lim_{x \to 1^-}$

and on the right: $\lim_{x \to 1^+}$

$$f(x) = \begin{cases} 2x - x^2 & \text{if } x < 1 \\ (x-1)^2 & \text{if } x \geq 1 \end{cases}$$

We can conclude that $f'(1)$ ______________________

(3) Which of these derivatives are you able to compute using derivative rules?

a) $f'(x)$ for $f(x) = 3x^2 - x + 5$

b) $g'(x)$ for $g(x) = e^{3x}$

c) $h'(t)$ for $h(t) = t\ln(t)$

d) $R'(q)$ for $R(q) = p(q) \cdot q$, where p is some function of q

e) $P'(q)$ for $P(q) = \dfrac{q^2 + q - 1}{q\sin(q)}$