

Calculus Worksheet: Derivatives of Stepwise Functions (1)

If

$$f(x) = \begin{cases} x^3, & x \leq 1 \\ 3x-2, & x > 1 \end{cases}$$

does $f'(1)$ exist? If yes find its value.

$$\lim_{x \rightarrow 1^-} f(x) = 1$$

$$\lim_{x \rightarrow 1^+} f(x) = 1$$

$$\text{also } f(1) = 1.$$

|| $f(x)$ is defined and continuous for all x including $x=1$.

Also:

$$f'(x) = 3x^2, \quad x < 1$$

$$f'(x) = 3, \quad x > 1.$$

Free calculus worksheets from www.analyzemath.com

$$\lim_{x \rightarrow 1^-} f'(x) = 3$$

hence

$$\lim_{x \rightarrow 1^+} f'(x) = 3$$

$$\lim_{x \rightarrow 1} f'(x) = 3$$

$$\underline{\underline{f'(1) = 3}}$$