AP Calculus-AB Limits, Continuity, & R.O.C Day 9

Notes: Approximating Instantaneous Rate of Change

Terminology and Notation:

The *derivative* of f at $x=a$ is the instantaneous rate of change of f at $x=a$. The following notations are used for the derivative of f at $x=a$:

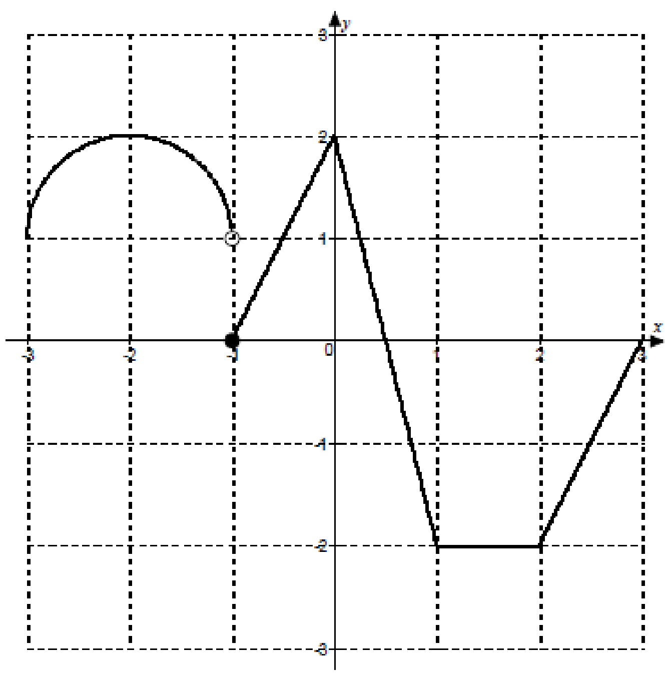
$$f'(a) \qquad \left.\frac{df}{dx}\right|_{x=a}$$

Example(s) 1: Use the given table to approximate the expressions below.

x	–2	–1	0	1	2
$f(x)$	–10	–7	0	2	6
$g(x)$	3	1	–4	–2	5

A.) $f'(-1)$ B.) $g'(2)$ C.) $-6g'(1)$ D.) $3g'(0)-f'(2)$

Example(s) 2: Use the graph of f below to approximate each derivative.



A.) $f'(-2)$ B.) $f'(-1)$

C.) $f'\left(-\frac{1}{2}\right)$ D.) $f'(0)$

E.) $f'\left(\frac{1}{2}\right)$ F.) $f'(1)$

G.) $f'\left(\frac{3}{2}\right)$ H.) $f'(2)$

I.) $f'\left(\frac{5}{2}\right)$

Differentiability:

We say that a function is differentiable at a point if a derivative is defined at the point. A function f will fail to be differentiable at $x = a$ if

- f is discontinuous at $x = a$,
- f has a cusp or corner at $x = a$, or
- f has a vertical tangent at $x = a$

Example(s) 3: State where each function is not differentiable and why.