

Quiz 2

Name: key

Row: \_\_\_\_\_

1. Suppose  $f(x)$  is a function. Give the definition of  $f'(a)$  as a limit.

$$[4] \quad f'(a) = \lim_{h \rightarrow 0} \left[ \frac{f(a+h) - f(a)}{h} \right]$$

2. Use the definition of derivative to find  $f'(a)$  if  $f(x) = 2x^3 - 7x$ . Show all work.

$$f'(a) = \lim_{h \rightarrow 0} \left\{ \frac{[2(a+h)^3 - 7(a+h)] - [2a^3 - 7a]}{h} \right\}$$

$$= \lim_{h \rightarrow 0} \left\{ \frac{[2(a^3 + 3a^2h + 3ah^2 + h^3) - 7(a+h)] - [2a^3 - 7a]}{h} \right\}$$

$$= \lim_{h \rightarrow 0} \left\{ \frac{\cancel{2a^3} + 6a^2h + 6ah^2 + 2h^3 - 7a - 7h - \cancel{2a^3} + 7a}{h} \right\}$$

$$= \lim_{h \rightarrow 0} \left\{ \frac{\cancel{6a^2h} + \cancel{6ah^2} + 2h^3 - 7h}{h} \right\}$$

$$= \lim_{h \rightarrow 0} \left\{ \cancel{6a^2} + 6ah + 2h^2 - 7 \right\} = \{6a^2 + 0 + 0 - 7\}$$

$$= \boxed{6a^2 - 7}$$