MATH 130 QUIZ 3 (Sect. 3.3-3.4) 09/26/2011

Name______________KEY_________________________ Section 0251

Answer all problems. There are 10 possible points.

1) The distance in feet of an object from a starting point is given by $S(t) = 2t + 9$, where t is time in seconds.

(a) (3 pts) Find the average velocity of the object from 2 seconds to 8 seconds.

$$\frac{S(8) - S(2)}{8 - 2} = \frac{(2(8) + 9) - (2(2) + 9)}{6} = \frac{12}{6} = 2 \text{ feet per second.}$$

(b) (3pts) Find the instantaneous velocity at 6 seconds.

$$\lim_{h \to 0} \frac{S(6 + h) - S(6)}{h} = \lim_{h \to 0} \frac{(2(6 + h) + 9) - (2(6) + 9)}{h} = \lim_{h \to 0} \frac{2h}{h} = 2 \text{ feet per second.}$$

2) (4pts) Use the limit definition of derivative to find $f'(x)$ when $f(x) = \sqrt{x} + 2$.

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

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

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

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

$$= \frac{1}{2\sqrt{x}}.$$