mr. Konichek
Hmwk 2.6

2.6 Pg. 150 (11, 13, 23a, 27a, 29b)

11. $f(x) = 2x + 7$

1) $f(x+h) = 2(x+h)+7 = 2x + 7 + 2h$

2) $f(x+h) - f(x) = 2x + 7 + 2h - (2x+7)$
$= 2x + 7 + 2h - 2x - 7$
$= 2h$

3) $\frac{f(x+h) - f(x)}{h} = \frac{2h}{h} = 2$

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

13. $f(x) = 3x^2$

1) $f(x+h) = 3(x+h)^2 = 3(x^2 + 2xh + h^2)$
$= 3x^2 + 6xh + 3h^2$

2) $f(x+h) - f(x) = 3x^2 + 6xh + 3h^2 - 3x^2 = 3h^2 + 6xh$

3) $\frac{f(x+h) - f(x)}{h} = \frac{3h^2 + 6xh}{h} = 6x + 3h$

4) $\lim_{h \to 0} 6x + 3h = 6x$

23a) $f(x) = 2x^2 + 1$
$f'(x) = 4x$

27a.) $y = f(x) = x^2 + x$

Note Textbook answers are wrong

avg. rate of change of y with respect to x in the interval
$x=2$ to $x=3$ $x=2$ to $x=2.5$ $x=2$ to $x=2.1$

The avg. rate of change

$\frac{f(x+h) - f(x)}{h} = \frac{[(x+h)^2 + (x+h)] - (x^2 + x)}{h} = \frac{2x^2 + 2xh + h^2 + x + h - x^2 - x}{h}$

$= 2x + h$ so $2(2)+1 = 5$, $2(2)+.5 = 4.5$, $2(2)+.1 = 4.1$

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Hmwk 2.6 cont.

2.6 Pg 151 (29b.)

29. b. $s = f(t) = 2t^2 + 48t$

The average rate of change

$$\frac{f(x+h)-f(x)}{h} = \frac{2(x+h)^2+48(x+h)-(2x^2+48x)}{h}$$

$$= \frac{2(x^2+2xh+h^2)+48x+48h-2x^2-48x}{h}$$

$$= (2x^2+4xh+2h^2+48h-2x^2)/h$$

$$= \frac{4xh+2h^2+48h}{h}$$

$$= 4x + 2h + 48$$

so the instantaneous velocity of the car when $t = 20$ so $h = 0$

$$= 4(20) + 48 = \boxed{128 \frac{ft}{sec}}$$