Math 1121 HW #4

Section 3.4 # 49/53

Section 4.1 # 4/10, 38/44

Extra Problems # 4

3.4 #49 $D(p) = -2p^2 - 4p + 300$

a. $D'(p) = \lim_{h\to 0} \frac{D(p+h) - D(p)}{h} = \lim_{h\to 0} \frac{-2(p+h)^2 - 4(p+h) + 300 - (-2p^2 - 4p + 300)}{h}$

$= \lim_{h\to 0} \frac{-2(p^2 + 2ph + h^2) - 4p - 4h + 300 + 2p^2 + 4p - 300}{h}$

$= \lim_{h\to 0} \frac{-2p^2 - 4ph - 2h^2 - 4p - 4h + 300 + 2p^2 + 4p - 300}{h}$

$= \lim_{h\to 0} \frac{-4ph - 2h^2 - 4h}{h} = \lim_{h\to 0} \frac{h(-4p - 2h - 4)}{h}$

$= \lim_{h\to 0} -4p - 2h - 4 = -4p - 2\cdot 0 - 4 = -4p - 4$

b. $D'(10) = -4\cdot 10 - 4 = -44$

This means that if the price is \$10 and then I increase the price by \$1, then the demand will fall by 44.

4.1 #4 $y = 5x^4 + 9x^3 + 12x^2 - 7x$

$y' = 20x^3 + 27x^2 + 24x - 7$

4.1 #38

$f(x) = x^3 + 15x^2 + 63x - 10$

$f'(x) = 3x^2 + 30x + 63$

"tangent line horizontal" means $f'(x) = 0$:

$3x^2 + 30x + 63 = 0$

$x^2 + 10x + 21 = 0$

$(x+3)(x+7) = 0$

$x+3 = 0 \qquad x+7 = 0$

$x = -3 \qquad x = -7$

Extra problems #4