Math 119 HW # 4

Section 4.1 #14, 29, 38

Section 4.2 # 9, 28

4.1 #14

$y = \frac{3}{x^6} + \frac{1}{x^5} - \frac{7}{x^2}$

$y = 3x^{-6} + x^{-5} - 7x^{-2}$ so $\frac{dy}{dx} = -18x^{-7} - 5x^{-6} + 14x^{-3}$

4.1 #29

$f(x) = \frac{x^4}{6} - 3x = \frac{1}{6}x^4 - 3x$

$f'(x) = \frac{4}{6}x^3 - 3$

$= \frac{2}{3}x^3 - 3$

so $f'(-2) = \frac{2}{3}(-2)^3 - 3$

$= \frac{2}{3} \cdot -8 - 3$

$= \frac{-16}{3} - \frac{9}{3} = -\frac{25}{3}$

4.1 #38

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

find where tangent line is horizontal.

We need $f'(x) = 0$, so

$f'(x) = 3x^2 + 30x + 63$, set $= 0$

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

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

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

$x = -3, -7.$

4.2 #9

$$p(y) = (y^{-1}+y^{-2})(2y^{-3}-5y^{-4})$$

$$p'(y) = (y^{-1}+y^{-2})\cdot(-6y^{-4}+20y^{-5}) + (2y^{-3}-5y^{-4})(-y^{-2}-2y^{-3})$$

4.2 #28

$$g(x) = \frac{(2x^2+3)(5x+2)}{6x-7}$$

$$g'(x) = \frac{(6x-7)\cdot\overbrace{\left((2x^2+3)\cdot 5+(5x+2)\cdot 4x\right)}^{\text{deriv. of top (product rule)}} - (2x^2+3)(5x+2)\cdot 6}{(6x-7)^2}$$