2.8

a) $(200)' = 0$

b) $\left(\dfrac{2x^3-5x^2+4x}{6}\right)' =$

$$= \frac{(6x^2-10x+4)\cdot 6 - \cancel{(2x^3-5x^2+4x)\cdot 0}}{6^2} = \frac{\cancel{2}^{1}(3x^2-5x+2)}{\cancel{6}_{3}} =$$

$$= \frac{3x^2-5x+2}{3} = \frac{3x^2}{3} - \frac{5x}{3} + \frac{2}{3} = x^2 - \frac{5}{3}x + \frac{2}{3}$$

<u>ou</u>

$$\left(\frac{2x^3-5x^2+4x}{6}\right)' = \frac{1}{6}\cdot(2x^3-5x^2+4x)' = \frac{1}{6}\cdot(6x^2-10x+4) =$$

$$= \frac{\cancel{6}^{1}}{\cancel{6}_{1}}x^2 - \frac{10}{6}x + \frac{4}{6} = x^2 - \frac{5}{3}x + \frac{2}{3}$$

c) $\left(\dfrac{3}{2x^3}\right)' = \dfrac{0\cdot 2x^3 - 3\cdot 6x^2}{(2x^3)^2} = \dfrac{-\cancel{18}^{9}\cancel{x^2}}{\cancel{4}_{2}x^{\cancel{6}\,4}} = \dfrac{-9}{2x^4}$

d) $\left((16-x^2)^3\right)' =$

$(u^n)' = n\cdot u^{n-1}\cdot u'$

$u = 16 - x^2 \rightarrow u' = 0 - 2x = -2x$

$\Rightarrow \left((16-x^2)^3\right) = 3(16-x^2)^2\cdot(-2x) = -6x(16-x^2)^2 = -6x(4-x)^2(4+x)^2$

e) $\left(\dfrac{4x}{(x+1)^2}\right)'$

$u = 4x \rightarrow u' = 4$

$v = (x+1)^2 \rightarrow v' = 2(x+1)^1\cdot 1 = 2(x+1)$

$\left(\dfrac{u}{v}\right)' = \dfrac{u'v - uv'}{v^2} \Rightarrow \left(\dfrac{4x}{(x+1)^2}\right)' = \dfrac{4(x+1)^2 - 4x\cdot 2(x+1)}{(x+1)^4} =$

$$= \frac{4\cancel{(x+1)}[(x+1)-2x]}{(x+1)^{\cancel{4}\,3}} = \frac{4(x+1-2x)}{(x+1)^3} = \frac{4(1-x)}{(x+1)^3}$$

f) $\left((2x-7)(x+2)^3\right)'$

$u = 2x-7 \rightarrow u' = 2$

$v = (x+2)^3 \rightarrow v' = 3(x+2)^2 \cdot 1 = 3(x+2)^2$

$(u \cdot v)' = u' \cdot v + u \cdot v' \Rightarrow$

$$\Rightarrow \left((2x-7)\cdot(x+2)^3\right)' = 2(x+2)^3 + (2x-7)\cdot 3(x+2)^2 =$$

$$= (x+2)^2\left[2(x+2) + 3(2x-7)\right] =$$

$$= (x+2)^2(2x+4+6x-21) = (x+2)^2(8x-17)$$

g) $\left(\dfrac{60-12x}{(3-x)^2}\right)' = \left(12 \cdot \dfrac{5-x}{(3-x)^2}\right)' = 12 \cdot \left(\dfrac{5-x}{(3-x)^2}\right)'$

$u = 5-x \rightarrow u' = -1$

$v = (3-x)^2 \rightarrow v' = 2(3-x)^1 \cdot (-1) = -2(3-x)$

$\left(\dfrac{u}{v}\right) = \dfrac{u' \cdot v - u \cdot v'}{v^2} \Rightarrow$

$$\Rightarrow 12 \cdot \left(\frac{5-x}{(3-x)^2}\right)' = 12 \cdot \frac{-1(3-x)^2 - (5-x)\cdot(-2\cdot(3-x))}{(3-x)^4} =$$

$$= 12 \cdot \frac{-(3-x)^2 + 2(5-x)(3-x)}{(3-x)^4} = 12 \cdot \frac{\cancel{(3-x)}\left[\overbrace{-(3-x)+2(5-x)}^{-3+x+10-2x}\right]}{(3-x)^{\cancel{4}3}} =$$

$$= 12 \cdot \frac{7-x}{(3-x)^3} = \frac{12(7-x)}{(3-x)^3} = \frac{-12(x-7)}{(3-x)^3}$$

h) $\left(\dfrac{1}{(4x^2-1)^4}\right)'$

$v = (4x^2-1)^4 \rightarrow v' = 4(4x^2-1)^3 \cdot 8x = 32x(4x^2-1)^3$

$$\left(\frac{1}{v}\right)' = \frac{-v'}{v^2} \Rightarrow \left(\frac{1}{(4x^2-1)^4}\right)' = \frac{-32x\,\cancel{(4x^2-1)^3}}{(4x^2-1)^{\cancel{8}5}} = \frac{-32x}{(2x+1)^5\cdot(2x-1)^5}$$

i) $\left(\frac{x^4}{(2x+3)^2}\right)'$ $\qquad u = x^4 \to u' = 4x^3$

$v = (2x+3)^2 \to v' = 2(2x+3)^1 \cdot 2 = 4(2x+3)$

$$\left(\frac{u}{v}\right)' = \frac{u'v - uv'}{v^2} \Rightarrow$$

$$\Rightarrow \left(\frac{x^4}{(2x+3)^2}\right)' = \frac{4x^3\cdot(2x+3)^2 - x^4\cdot 4(2x+3)}{(2x+3)^4} = \frac{4x^3\cancel{(2x+3)}\left[(2x+3)-x\right]}{(2x+3)^{\cancel{4}\,3}} =$$

$$= \frac{4x^3(x+3)}{(2x+3)^3}$$

j) $\left(\frac{(2x-5)^3}{(1-x)^3}\right)'$ $\qquad u = (2x-5)^3 \to u' = 3(2x-5)^2\cdot 2 = 6(2x-5)^2$

$v = (1-x)^3 \to v' = 3(1-x)^2\cdot(-1) = -3(1-x)^2$

$$\left(\frac{(2x-5)^3}{(1-x)^3}\right)' = \frac{6(2x-5)^2(1-x)^3 - (2x-5)^3\cdot\left(-3(1-x)^2\right)}{(1-x)^6} =$$

$$= \frac{6(2x-5)^2(1-x)^3 + 3(2x-5)^3(1-x)^2}{(1-x)^6} = \frac{3(2x-5)^2\cancel{(1-x)^2}\overbrace{\left[2(1-x)+(2x-5)\right]}^{2-\cancel{2x}+\cancel{2x}-5}}{(1-x)^{\cancel{6}\,4}} =$$

$$= \frac{3(2x-5)^2\cdot(-3)}{(1-x)^4} = \frac{-9(2x-5)^2}{(1-x)^4}$$