1.

a. $5x^4 + 6x^2 - 8x + 0 - 11 = 5x^4 + 6x^2 - 8x - 11$

b. $\frac{d}{dx}(4x + 5x^6).(x^2 - 2) + \frac{d}{dx}(x^2 - 2).(4x + 5x^6)$

$$= (4 + 30x^5).(x^2 - 2) + (2 - 0).(4x + 5x^6)$$
$$= (4x^2 - 8 + 30x^7 - 60x^5) + (8x + 10x^6)$$
$$= 30x^7 + 10x^6 - 60x^5 + 4x^2 + 8x - 8$$

c. $4x^{-2} - 2x^{-1} = -8x^{-3} + 2x^{-2} = -\frac{8}{x^3} + \frac{2}{x^2}$

d. $\frac{\frac{d}{dx}(3+2x^2).(2+x^2) - \frac{d}{dx}(2+x^2).(3+2x^2)}{(2+x^2)^2} = \frac{(0+4x).(2+x^2) - (0+2x).(3+2x^2)}{4+4x^2+x^4} = \frac{2x}{x^4+4x^2+4}$

2.

a. $\lim_{t\to\infty}\left(100 + \frac{2000t}{t+1}\right) = 100 + 2000.\lim_{t\to\infty}\left(\frac{t}{t+1}\right) = 100 + 2000.\lim_{t\to\infty}\left(\frac{\frac{t}{t}}{\frac{t}{t}+\frac{1}{t}}\right)$

$=100 + 2000.\lim_{t\to\infty}\left(\frac{1}{1+\frac{1}{t}}\right) = 100 + 2000.\left(\frac{1}{1+0}\right) = 100 + 2000.1 = 2100$

b. $\frac{d}{dt}\left(100 + \frac{2000t}{t+1}\right) = \frac{d}{dt}(100) + \frac{d}{dt}\left(\frac{2000t}{t+1}\right) = 0 + \frac{\frac{d}{dt}2000t.(t+1) - \frac{d}{dt}(t+1).2000t}{(t+1)^2}$

$$= \frac{2000.(t+1) - (1+0).2000t}{t^2 + 2t + 1} = \frac{2000t + 2000 - 2000t}{t^2 + 2t + 1} = \frac{2000}{t^2 + 2t + 1}$$
$$= \frac{2000}{3^2 + 2(3) + 1} = \frac{2000}{9 + 6 + 1} = \frac{2000}{16} = 125$$

3. $\frac{d}{dx}(x^3 - 2x^2 + 7) = 3x^2 - 4x$

$$a = 3(2)^2 - 4(2) = 12 - 8 = 4$$
$$y - f(2) = a(x - 2) \to y - 7 = 4(x - 2) \to y = 4x - 1$$

4.

a. $\lim_{x\to 2^-}(3x + 1) = 3(2^-) + 1 = 6^- + 1 = 7^-$

$$\lim_{x\to 2^+}(13 - 3x) = 13 - 3(2^+) = 13 - 6^+ = 7^+$$

A função é contínua em x=2

b. $\lim_{x\to 2^-}(\frac{d}{dx}(3x + 1)) = \lim_{x\to 2^-}(3 + 0) = 3$

$$\lim_{x\to 2^+}(\frac{d}{dx}(13 - 3x)) = \lim_{x\to 2^+}(0 - 3) = -3$$

A função é diferenciável em x=2