1. La velocidad del móvil a los 5 segundos es de 30 m/s

2. i) a) $f'(2) = 14$ b) $f'(0) = 3$

   ii) a) $f'(x) = -\dfrac{1}{x^2}$ b) $f'(x) = 0$

3. a) $y_T = x - 1/2$ $y_N = -x + 3/2$

   b) $y_T = 1/4\ x - 3/4$ $y_N = -4x + 12$

3. a), c) y d)

4. a) $f$ es derivable en a = 0

   b) $f$ no es derivable en a = 1

5. a) $f'(x) = \begin{cases} 2x - 3 & si\ x < 1 \\ \dfrac{2}{x^2} & si\ x > 1 \end{cases}$ b) $f'(x) = \begin{cases} 2 & si\ x > 1 \\ 2x & si\ x < 1 \\ 2 & si\ x = 1 \end{cases}$

6. a) $f$ es continua pero no derivable en $x_0 = 2$

   b) $f$ es continua y derivable en $x_0 = 1$

   c) $f$ no es continua en $x_0 = -2$, f es continua pero no derivable en $x_1 = -3$

7. a) $f'(x) = 3x^2 + 6$ b) $f'(x) = -\dfrac{2}{(x+1)^2}$

   c) $f'(x) = 1 \quad \forall x > 0$ d) $f'(x) = -\dfrac{1}{x^2} + 3x^4(5\cos x - x\,sen\,x)$

   e ) $f'(x) = \dfrac{-2(\cos x + sen\,x) + 1}{(2 - \cos x)^2}$

   f) f'(x) = m g) $f'(x) = \dfrac{\ln x}{\cos^2 x} + \dfrac{tg\,x}{x}$

   h) $f'(t) = 2^t \ln 2\, tgt + \dfrac{2^t}{\cos^2 t} + \ln t + 1$ i) $f'(x) = \dfrac{1}{\sqrt{2}} e^x (x+2)$

   j)$f'(x) = \dfrac{(\ln x + \pi + 1)(\sqrt{2} - \cos x) - x\,sen x\,(\ln x + \pi)}{(\sqrt{2} - \cos x)^2}$ k) k)

$f'(x) = -sen\,x + \dfrac{\cos x - \ln 2\,sen\,x}{2^x}$

l) $f'(x) = 6x^2 + \dfrac{7}{2\sqrt{x^5}} - \dfrac{1}{3\sqrt[3]{x^4}}$

m) $f'(x) = \left(x^2 + \dfrac{5\sqrt[3]{x^4}}{3}\right)\dfrac{1}{(x+\sqrt[3]{x})^2}$

n) $f'(h) = \dfrac{2a(-2h^5 - 6h^3 + 1)}{(h^5 + 6h^3 + 2)^2}$

o) $f'(x) = \left(\dfrac{1}{2\sqrt{x}} + 1\right)(x^2 + 3x - 2) + (\sqrt{x} + x)(2x + 3)$

p) $f'(x) = \dfrac{3(1 - 2\ln x)}{x^3}$

9. P = (-2; 1)

10. a) $(f+g)'(3) = 1$ b) $h'(3) = 19$
    c) $(f \cdot g)'(3) = -23$ d) $l'(3) = -\dfrac{7}{25}$

11. En $t = v_0/g$

12. a) $g \circ f : R \to R;\quad (g \circ f)(x) = 3sen\,x + 1$
    $f \circ g : R \to R;\quad (f \circ g)(x) = sen\,(3x + 1)$

    b) $g \circ f : R \to R;\quad (g \circ f)(x) = 4e^x - 3$
    $f \circ g : R \to R;\quad (f \circ g)(x) = e^{4x-3}$

    c) $g \circ f : R^+ \to R;\quad (g \circ f)(x) = 2\log x - 3$
    $f \circ g : (3/2; +\infty) \to R;\quad (f \circ g)(x) = \log(2x - 3)$

    d) $g \circ f : (-\infty; 0] \to R;\quad (g \circ f)(x) = \sqrt{-x} - 5$
    $f \circ g : (-\infty; 5] \to R;\quad (f \circ g)(x) = \sqrt{5 - x}$

14. a) f ´(x) = senh x + cosh x b) $f'(x) = 3(3x + x^4)^2(3 + 4x^3)$

c) f ´(t) = 2 cos(2t) + sen 2 d) $f'(x) = -\dfrac{x}{4 - x^2}$

e) $f'(x) = 2\dfrac{1}{\sqrt{1 - 4x^2}}$

f) $f'(x) = \dfrac{1}{3}\left[\ln\left(\dfrac{1}{\cos x}\right)\right]^{-2/3}\dfrac{sen\,x}{\cos x} - \sqrt{\ln 3}\,2^{-x}\ln 2$

g) $f'(x) = \dfrac{2\ln x}{x} + \dfrac{2}{x}$ h) $f'(x) = \dfrac{3x^2\cos(x^3)}{sen(x^3)} - \dfrac{sen(\sqrt[3]{\ln(2x)})}{3x\sqrt[3]{(\ln(2x))^2}}$

i) $f'(x) = (\cos x - x\,sen\,x)2^{x\cos x}\ln 2$

j) $f'(x) = \dfrac{\cos(\ln(x^n - x))(n\,x^{n-1} - 1)}{3\sqrt[3]{sen^2(\ln(x^n - x))}\,(x^n - x)}$

k) $f'(x) = \dfrac{a\cosh x}{2\sqrt{a\ln(senh x)}\;senh x}$

l) $f'(x) = \dfrac{2x\,sen(3x) + 3x^2\cos(3x)}{3\sqrt[3]{(x^2 sen(3x))^2}}$

15. $v_0\, e^{\frac{-3t}{m}}$ ,

16. y ' (12) = 0,02 $e^{1,2}$

17. a) $f'(x) = 2x^{\ln x}\dfrac{\ln x}{x}$

b) $f'(x) = (\ln x)^x\left(\ln(\ln x) + \dfrac{1}{\ln x}\right)$

c) $f'(x) = (x + sen x)^{\frac{2}{x}}\left(-\dfrac{2\ln(x + sen x)}{x^2} + \dfrac{2(1+\cos x)}{x\,(x + sen x)}\right)$

d) $f'(x) = \dfrac{1}{3\sqrt[3]{x^2}}(sen x)^{x^2} + (sen\,x)^{x^2}\left(2x\ln(sen x) + x^2\dfrac{\cos x}{sen x}\right)$

18.

a) $y_T = -3/2\ x$ $\quad$ $y_N = 2/3\ x$

b) $y_T = -x - 1$ $\quad$ $y_N = x + 3$

19. P = (0; 0) Q = (2/3; $e^{-2}$/9)

20. a = 3 b = -3

21. $y_T = 11x + 3$

22. a) $f'(x) = 5x^4 + 24x^3 + 3$ $\quad$ $f''(x) = 20x^3 + 72x^2$ $\quad$ $f'''(x) = 60x^2 + 144x$

b) $f'(x) = -6x^2 e^{-2x^3+1}$ $\quad$ $f''(x) = -e^{-2x^3+1}(12x - 36x^4)$

$f'''(x) = e^{-2x^3+1}(216x^3 - 12 - 216x^6)$

c) $f'(x) = 1 + \ln x$ $\quad$ $f''(x) = \dfrac{1}{x}$ $\quad$ $f'''(x) = -\dfrac{1}{x^2}$