HW 3 – solution

① a) $x = e^5$

b) $x = \ln 9$

② $f'(x_0) = \lim_{h \to 0} \frac{f(x_0+h) - f(x_0)}{h}$

③ a) $y' = 5x^4 - 12x^3 + 15x^2 + 2x - 7$

b) $y' = -3x^{-4} + \frac{1}{2}x^{-\frac{3}{2}} = -\frac{3}{x^4} + \frac{1}{2\sqrt{x^3}}$

c) $y' = 3x^2 \cdot \ln x + x^3 \cdot \frac{1}{x} = 3x^2 \cdot \ln x + x^2$

d) $y' = \frac{3x^2(x^2+1) - x^3 \cdot 2x}{(x^2+1)^2} = \frac{3x^4 + 3x^2 - 2x^4}{(x^2+1)^2} = \frac{x^4 + 3x^2}{(x^2+1)^2}$

e) $y' = -\sin(\ln x^2) \cdot \frac{1}{x^2} \cdot 2x = -\frac{2}{x} \cdot \sin(\ln x^2)$

f) $y' = 4(x^2 + 5x - 1)^3 \cdot (2x + 5)$