

Test Forkurs Matematikk OsloMet

10. februar 2020

Regn uten bruk av hjelpemiddel

Deriver følgende funksjoner.

$$a(x) = x^5 - 3x^2 + 7 \quad a'(x) = 5x^4 - 6x$$

$$b(x) = \frac{3}{x} + e^x = \frac{3 \cdot x^{-1} + e^x}{1}$$

$$b'(x) = \frac{-3}{x^2} + e^x$$

$$c(x) = \frac{x}{\sqrt[3]{27x}} \quad c'(x) = \frac{1}{3} \left(\frac{2}{3} \right) x^{\frac{2}{3}-1} = \frac{2}{9} x^{-1/3}$$

$$= \frac{x}{3\sqrt[3]{x^3}} = \frac{1}{3} \cdot x \cdot x^{-1/3} = \frac{1}{3} x^{2/3}$$

$$d(x) = \ln|x| + \ln|x^2 + 1|$$

$$d'(x) = \frac{1}{x} + \frac{1}{x^2+1} (x^2+1)' = \frac{1}{x} + \frac{2x}{x^2+1}$$

$$e(x) = \ln(\sqrt{x}(3-x)^7) \quad 0 < x < 3$$

$$e(x) = \ln x^{1/2} + \ln(3-x)^7 = \frac{1}{2} \ln x + 7 \ln(3-x)$$

$$e'(x) = \frac{1}{2} \cdot \frac{1}{x} + 7 \frac{1}{3-x} (3-x)'$$

$$f(x) = \frac{x^2}{x^2+1} = \frac{1}{2x} - \frac{7}{3-x}$$

$$f(x) = \frac{x^2+1-1}{x^2+1} = 1 - \frac{1}{x^2+1}, \quad f'(x) = (-1) \frac{(x^2+1)'}{(x^2+1)^2} = \frac{2x}{(x^2+1)^2}$$

$$g(x) = \frac{x^2}{(1+3x)^7}$$

$$= x^2 \cdot (1+3x)^{-7}$$

$$g'(x) = (x^2)' (1+3x)^{-7} + x^2 ((1+3x)^{-7})'$$

$$= 2x(1+3x)^{-7} + x^2 (-7)(1+3x)^{-8} \cdot 3$$

$$= \frac{2x(1+3x) - 21x^2}{(1+3x)^8}$$

$$h(x) = \sqrt{1+e^{\sqrt{x}}}$$

$$h'(x) = \frac{1}{2\sqrt{1+e^{\sqrt{x}}}} (1+e^{\sqrt{x}})'$$

$$= \frac{e^{\sqrt{x}}}{4\sqrt{x} \sqrt{1+e^{\sqrt{x}}}}$$

$$= \frac{-15x^2 + 2x}{(1+3x)^8}$$