

S 31 Nr. 3

$$a) f(x) = x \cdot (5-x) = 5x - x^2 \Rightarrow \underline{\underline{f'(x) = 5 - 2x}}$$

$$b) f(x) = (x+x^2) \cdot x = x^2 + x^3 \Rightarrow \underline{\underline{f'(x) = 2x + 3x^2}}$$

$$c) f(x) = x^2 \cdot (x+2) \cdot 5 = 5x^3 + 10x^2 \Rightarrow f'(x) = 5 \cdot 3x^2 + 10 \cdot 2x$$
$$\underline{\underline{f'(x) = 15x^2 + 20x}}$$

$$d) f(x) = (x+2)^2 = x^2 + 4x + 4 \Rightarrow \underline{\underline{f'(x) = 2x + 4}}$$

$$e) f(x) = 2 \cdot (x-2)^2 = 2 \cdot (x^2 - 4x + 4) = 2x^2 - 8x + 8$$
$$\Rightarrow \underline{\underline{f'(x) = 4x - 8}}$$

$$f) f(x) = (x-7)(x+7) = x^2 - 49 \Rightarrow \underline{\underline{f'(x) = 2x}}$$

S 31 Nr. 4

$$a) f(x) = x^4 ; f'(x) = 4x^3 ; x_0 = 0,5$$

$$t(x) = f'(x_0)(x-x_0) + f(x_0) = 4 \cdot 0,5^3 \cdot (x-0,5) + 0,5^4 = 0,5(x-0,5) + 0,0625$$

$$\underline{\underline{t(x) = 0,5x - 0,25 + 0,0625 = 0,5x - 0,1875 = \frac{1}{2}x - \frac{3}{16}}}$$

$$b) f(x) = 2x^{-2} ; f'(x) = 2 \cdot (-2) x^{-3} = \frac{-4}{x^3} ; x_0 = 3$$

$$t(x) = f'(x_0)(x-x_0) + f(x_0) = \frac{-4}{3^3}(x-3) + \frac{2}{3^2} = -\frac{4}{27}x + \frac{4}{3^2} + \frac{2}{3^2}$$

$$\underline{\underline{t(x) = -\frac{4}{27}x + \frac{6}{9} = -\frac{4}{27}x + \frac{2}{3}}}$$

$$c) f(x) = 2x^3 - 3 \cdot x^{-2} ; f'(x) = 6x^2 + 6x^{-3} = 6x^2 + \frac{6}{x^3} ; x_0 = 2$$

$$\underline{\underline{t(x) = (6 \cdot 2^2 + \frac{6}{2^3})(x-2) + 2 \cdot 2^3 - \frac{3}{2^2} = \frac{99}{4}(x-2) + \frac{61}{4} = \frac{99}{4}x - \frac{137}{4}}}$$

$$d) f(x) = \frac{1}{x} - x^{\frac{3}{2}} ; f'(x) = -\frac{1}{x^2} - \frac{3}{2}x^{\frac{1}{2}} = -\frac{1}{x^2} - \frac{3}{2}\sqrt{x} ; x_0 = 5$$

$$t(x) = (-\frac{1}{5^2} - \frac{3}{2}\sqrt{5}) \cdot (x-5) + \frac{1}{5} - (\sqrt{5})^3 \approx -3,39(x-5) - 10,98$$

$$\underline{\underline{t(x) = -3,39x + 5,99}}$$