Session 2

Aufgabe 1

(a) $f(x) = 3x^6 + \frac{1}{2}x^2 + x + 8$

$f'(x) = 18x^5 + x + 1$

(b) $f(x) = \sin(x) \cdot x + 2x$

$f'(x) = \cos(x) x + \sin(x) + 2$

(c) $\quad f(x) = (x+1)^{12}$

$\quad f'(x) = 12(x+1)^{11}$

(d) $\quad f(x) = \cos(3x)$

$\quad f'(x) = -3 \cdot \sin(x)$

(e) $\quad f(x) = e^{x^2 + 3x}$

$\quad f'(x) = \left(e^{x^2 + 3x}\right) \cdot (2x + 3)$

(f) $\quad f(x) = \ln(2x+3)$

$\quad f'(x) = \dfrac{2}{2x+3}$

(g) $\quad f(x) = \sqrt{x^2 + 1} = (x^2 + 1)^{1/2}$

$\quad f'(x) = \frac{1}{2}(x^2 + 1)^{-1/2} \cdot 2x \qquad = \dfrac{2x}{2\sqrt{x^2+1}}$

(h)
$\quad f(x) = \dfrac{2x+3}{x^2+1} \quad , \quad f'(x) = \dfrac{2(x^2+1) - (2x+3)2x}{(x^2+1)^2}$

$\qquad\qquad\qquad\qquad\qquad = \dfrac{2x^2 + 2 - 4x^2 - 6x}{(x^2+1)^2}$

$\qquad\qquad\qquad\qquad\qquad = \dfrac{-2x^2 + 2 - 6x}{(x^2+1)^2}$

$f(x) = x^2 - 3x + 7$

$f'(x) = 2x - 3 \qquad \Rightarrow \qquad f'(2) = 1$

Lsg 1: $\qquad y = 1 \cdot x + c \qquad\qquad$ geht durch Pkt $(2, 5)$

$\Rightarrow \quad 5 = 1 \cdot 2 + c \quad \Rightarrow \quad \underline{\underline{c = 3}}$

$\qquad y = x + 3$

Lsg 2: $\qquad y = 1 \cdot (x - 2) + 5$

$\qquad\qquad\quad = x - 2 + 5 \quad = \quad x + 3$

Aufgabe 3

(i) $\quad f(x) = 3x^2 + 4$

$\quad f'(x) = 6x$

$\quad f''(x) = 6$

(ii) $\quad f(x) = e^{\sin(x^2)}$

$\quad f'(x) = e^{\sin(x^2)} \cdot \cos(x^2) \cdot 2x$

$\quad f''(x) = e^{\sin(x^2)} \cdot \left(\cos(x^2)\right)^2 \cdot 4x^2 + e^{\sin(x^2)} \left(-\sin(x^2) \cdot 4x^2 \right.$
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \left. + \cos(x^2) \cdot 2\right)$

$\quad = e^{\sin(x^2)} \left(\left(\cos(x^2)\right)^2 \cdot 4x^2 - \sin(x^2) \cdot 4x^2 + 2\cos(x^2)\right)$