



Kurzlösungen Woche 3

2/17.12 a-d: a) $\frac{\partial z}{\partial x} = \frac{1}{2\sqrt{2x+3xy+4y}} \cdot (2+3y) = \frac{5}{2\sqrt{9}} = \frac{5}{6}$

$$\frac{\partial z}{\partial y} = \frac{1}{2\sqrt{2x+3xy+4y}} (3x+4) = \frac{7}{6}$$

b) $\frac{\partial z}{\partial x} = -\sin(xy + e^{xy}) \{y(1+e^{xy})\} = -2 \sin(1) \approx -1,683$

$$\frac{\partial z}{\partial y} = -\sin(xy + e^{xy}) \{x(1+e^{xy})\} = 0$$

c) $\frac{\partial z}{\partial x} = 2y x^{2y-1} = 2 \cdot 2^1 = 4$

$$\frac{\partial z}{\partial y} = [\ln(x)] \cdot x^{2y} \cdot 2 = 8 \cdot \ln(2) \approx 5,55$$

d) $\frac{\partial z}{\partial x} = \frac{1}{2-e^{x-y}} (-e^{x-y}) = 1 \cdot (-1) = -1$

$$\frac{\partial z}{\partial y} = \frac{1}{2-e^{x-y}} (-e^{x-y})(-1) = 1$$

2/17.15 b-e: b) → Übung

c) $z_x = e^{\frac{y}{x}} (1 - \frac{y}{x})$ $z_y = e^{\frac{y}{x}}$ $z_{xx} = \frac{y^2}{x^3} e^{\frac{y}{x}}$ $z_{yy} = \frac{1}{x} y e^{\frac{y}{x}}$
 $z_{xy} = z_{yx} = -\frac{y}{x^2} e^{\frac{y}{x}}$

d) $z_x = \frac{2x}{x^2+y}$ $z_y = \frac{1}{x^2+y}$ $z_{xx} = \frac{2(y-x^2)}{(x^2+y)^2}$ $z_{yy} = \frac{-1}{(x^2+y)^2}$
 $z_{xy} = z_{yx} = \frac{-2x}{(x^2+y)^2}$

e) $z_x = y \cdot \arcsin(x) + \frac{xy}{\sqrt{1-x^2}}$ $z_y = x \cdot \arcsin(x)$
 $z_{xx} = \frac{2y}{\sqrt{1-x^2}} + \frac{x^2 y}{(1-x^2)\sqrt{1-x^2}} = \frac{y(2-x^2)}{(1-x^2)^{3/2}}$ $z_{yy} = 0$
 $z_{xy} = z_{yx} = \arcsin(x) + \frac{x}{\sqrt{1-x^2}}$

2/17.16: → Übung
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$$2/19.3a: \text{grad } u = \begin{pmatrix} 2xz + yze^{xyz} \\ -2yz + xze^{xyz} \\ (x^2 - y^2) + xy e^{xyz} \end{pmatrix}$$

2/19.4 a, b, c, e: a) $(2, 5, -6)^T$; Ebenen

b) $(a_1, a_2, a_3)^T$; Ebenen

c) $\frac{1}{r} \leq$; $\begin{cases} \text{Kugel} & c > 0 \\ \text{Punkt} & c = 0 \\ \emptyset & c < 0 \end{cases}$

e) $-\frac{1}{r^3} \leq$; $\begin{cases} \text{Kugel} & c > 0 \\ \emptyset & c \leq 0 \end{cases}$

$$2/19.6 a: \text{grad } u(P) = \begin{pmatrix} 5 \\ 5 \\ 6 \end{pmatrix}$$

$$2/17.23 b: 8x + 4y - z = 10$$

$$2/18.12: c = 225$$

$$2/17.29: |\Delta R| = 0,6875 \quad \left| \frac{\Delta R}{R} \right| = 0,61\%$$

$$2/17.30: |\Delta f| \leq 0,0336 \quad \left| \frac{\Delta f}{f} \right| \leq 0,95\%$$