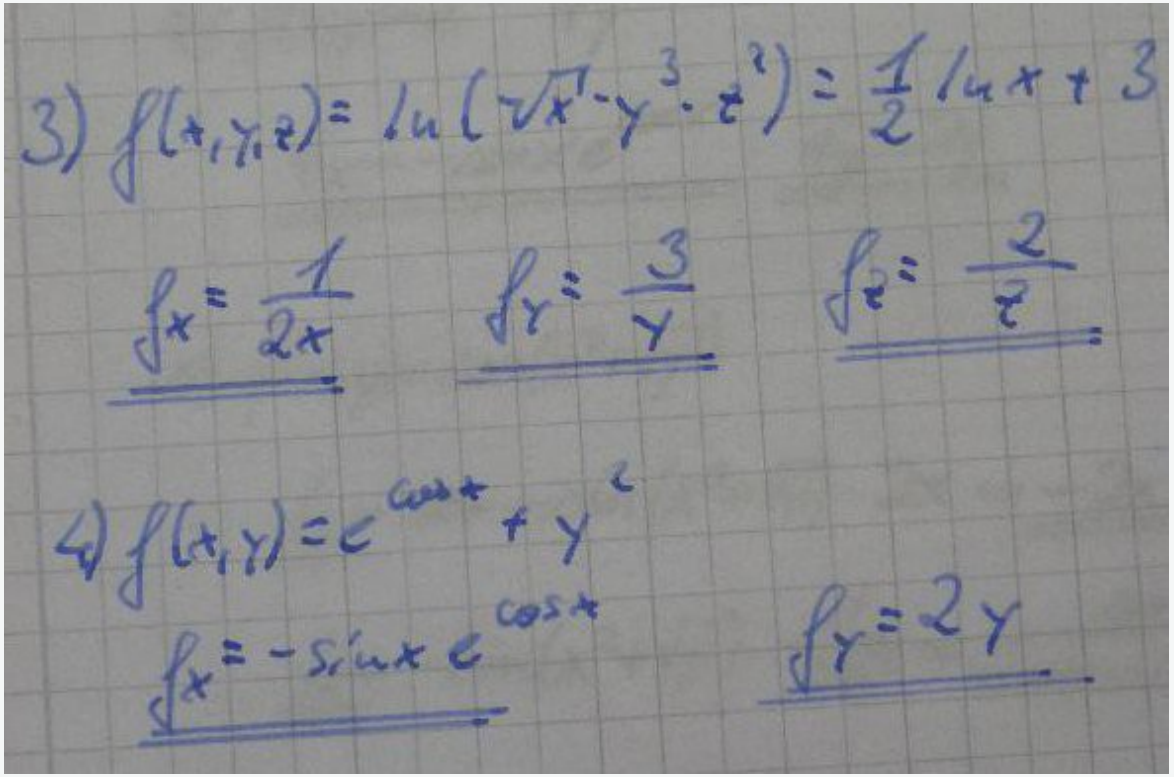


Partielle Ableitungen: Schriftliche Arbeit 1

Bestimmen Sie die partiellen Ableitungen 1. Ordnung der Funktion f

1) $f(x, y) = (2x + y)\, e^{x}$

2) $f(x, y, z) = \ln(x\, y) + e^{z^2}$

3) $f(x, y, z) = \ln(\sqrt{x}\ \ y^3\ z^2)$

4) $f(x, y) = e^{\cos x} + y^2$

5) $f(x, y) = \cos(x^2 + \sqrt{y})$

1) $f(x, y) = (2x + y)\, e^x$

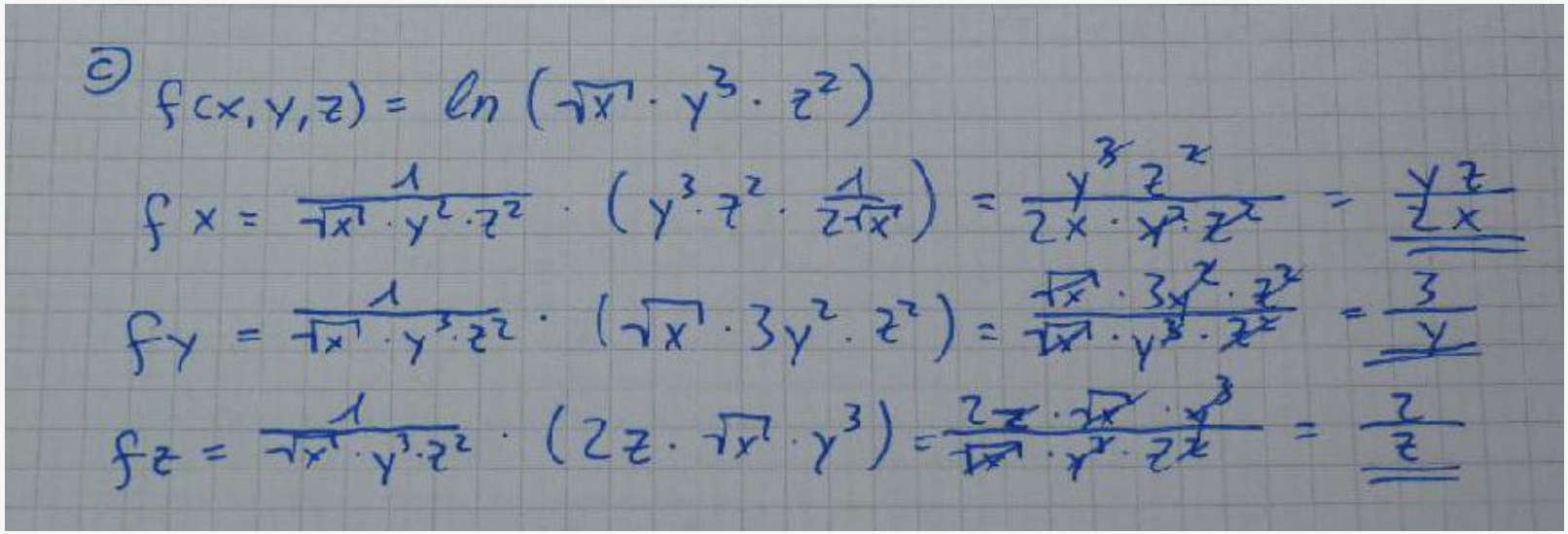
$$\frac{\partial f}{\partial x} = e^x \frac{\partial}{\partial x}(2x + y) + (2x + y)\frac{\partial}{\partial x} e^x = 2e^x + (2x + y)\, e^x =$$

$$= (2 + 2x + y)\, e^x$$

$$\frac{\partial f}{\partial y} = e^x \frac{\partial}{\partial y}(2x + y) = e^x$$

2) $f(x, y, z) = \ln(xy) + e^{z^2} = \ln x + \ln y + e^{z^2}$

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



3) $f(x, y, z) = \ln(\sqrt{x}\ y^3\ z^2) = \dfrac{1}{2}\ln x + 3\ln y + 2\ln z$

$$\frac{\partial f}{\partial x} = \frac{1}{2x}, \qquad \frac{\partial f}{\partial y} = \frac{3}{y}, \qquad \frac{\partial f}{\partial z} = \frac{2}{z}$$

4) $f(x, y) = e^{\cos x} + y^2$

$$\frac{\partial f}{\partial x} = e^{\cos x} \frac{\partial}{\partial x} \cos x = -\sin x \; e^{\cos x}$$

$$\frac{\partial f}{\partial y} = 2y$$

5) $f(x, y) = \cos(x^2 + \sqrt{y})$

$$\frac{\partial f}{\partial x} = -\sin(x^2 + \sqrt{y}) \frac{\partial}{\partial x} (x^2 + y^{\frac{1}{2}}) = -2x \sin(x^2 + \sqrt{y})$$

$$\frac{\partial f}{\partial y} = -\sin(x^2 + \sqrt{y}) \frac{\partial}{\partial y} (x^2 + y^{\frac{1}{2}}) = -\frac{1}{2\sqrt{y}} \sin(x^2 + \sqrt{y})$$