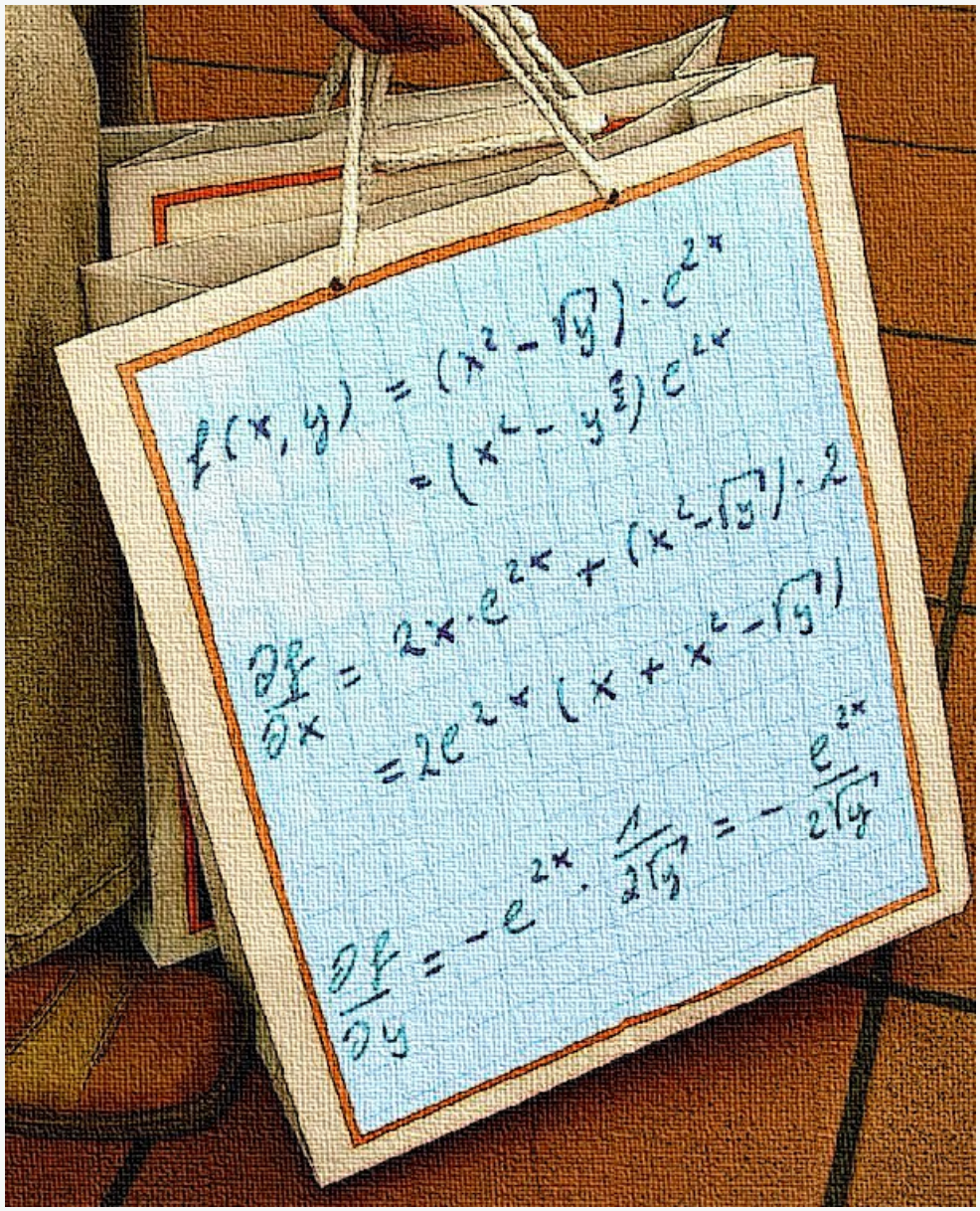


Partielle Ableitungen: Schriftliche Arbeit 2


FUJI RTP
Partielle Ableitungen

Bestimmen Sie die partiellen Ableitungen 1. Ordnung der Funktion f

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

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

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

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

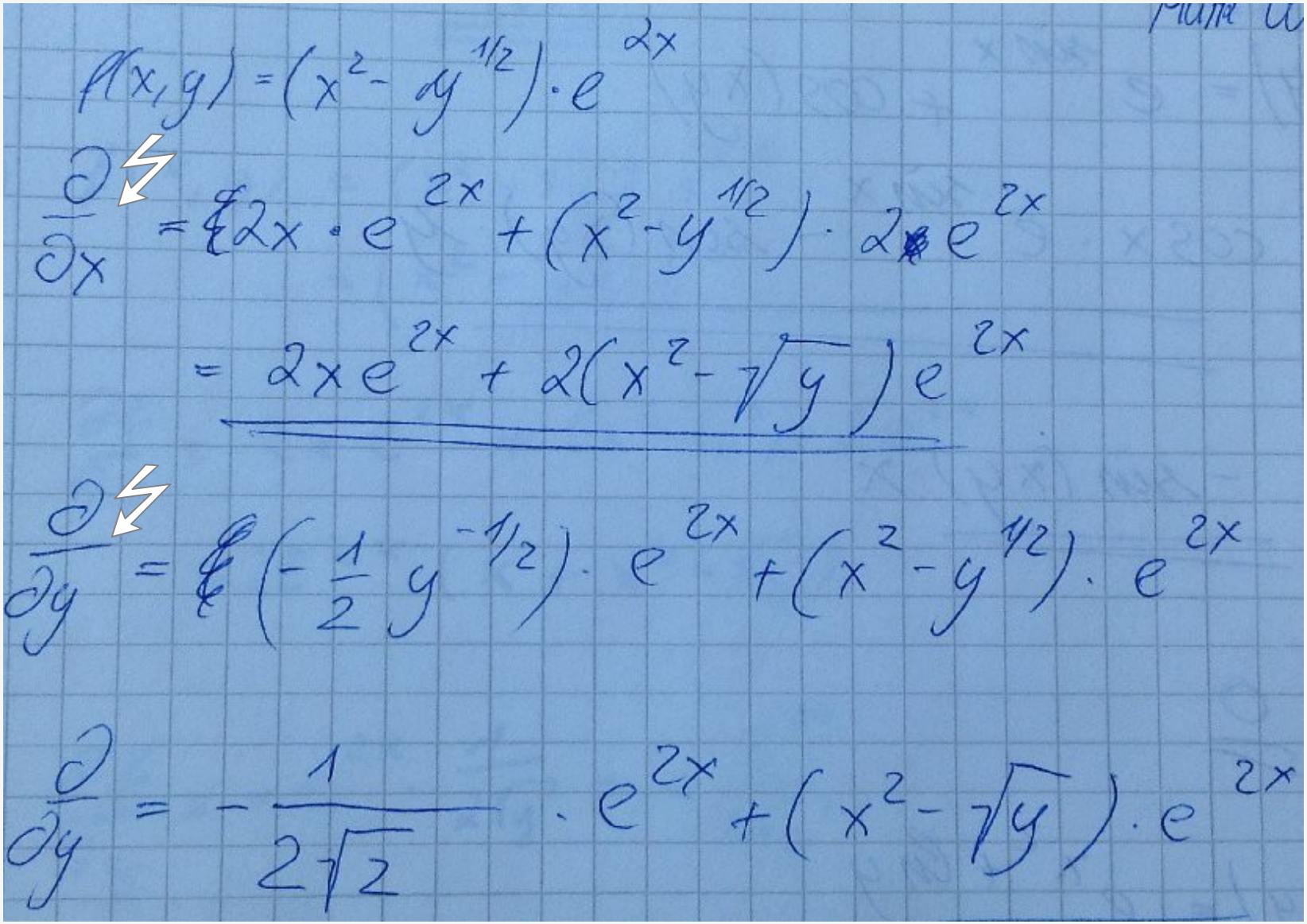
5) $f(x, y) = e^{x^2 + \ln y}$

$$f(x, y) = (x^2 - \sqrt{y})\, e^{2x}$$

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

$$= 2x e^{2x} + 2(x^2 - \sqrt{y}) e^{2x} = 2(x^2 + x - \sqrt{y}) e^{2x}$$

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

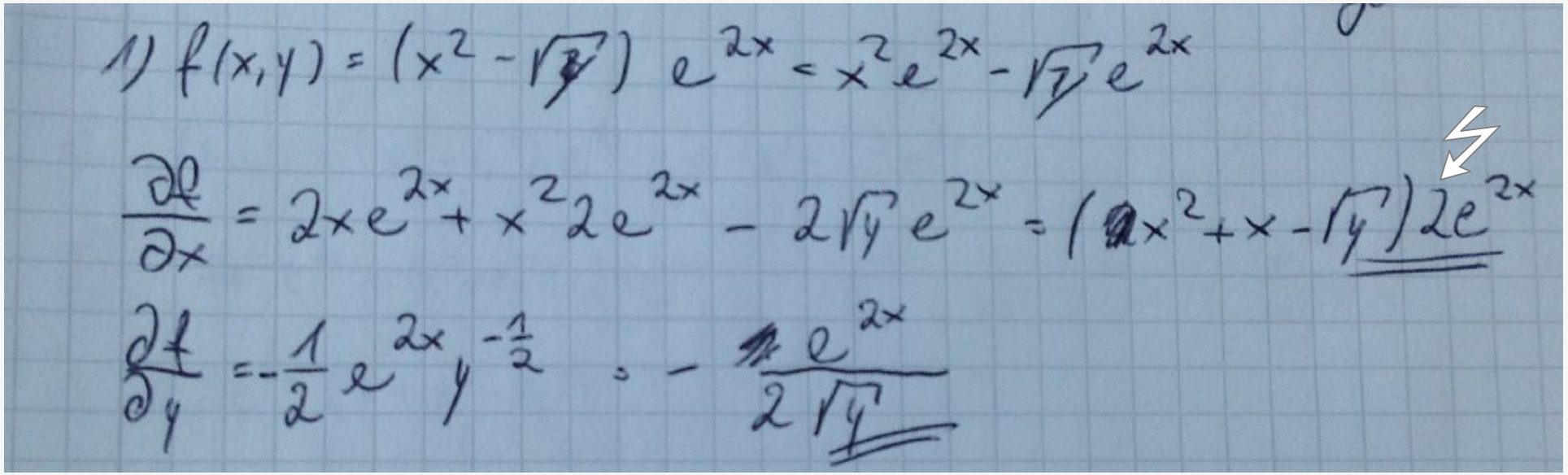

$f(x,y) = (x^2 - y^{1/2}) \cdot e^{2x}$
$\frac{\partial}{\partial x} = 2x \cdot e^{2x} + (x^2 - y^{1/2}) \cdot 2 e^{2x}$
$= 2x e^{2x} + 2(x^2 - \sqrt{y}) e^{2x}$
$\frac{\partial}{\partial y} = \left(-\frac{1}{2} y^{-1/2}\right) \cdot e^{2x} + (x^2 - y^{1/2}) \cdot e^{2x}$
$\frac{\partial}{\partial y} = -\frac{1}{2\sqrt{2}} \cdot e^{2x} + (x^2 - \sqrt{y}) \cdot e^{2x}$

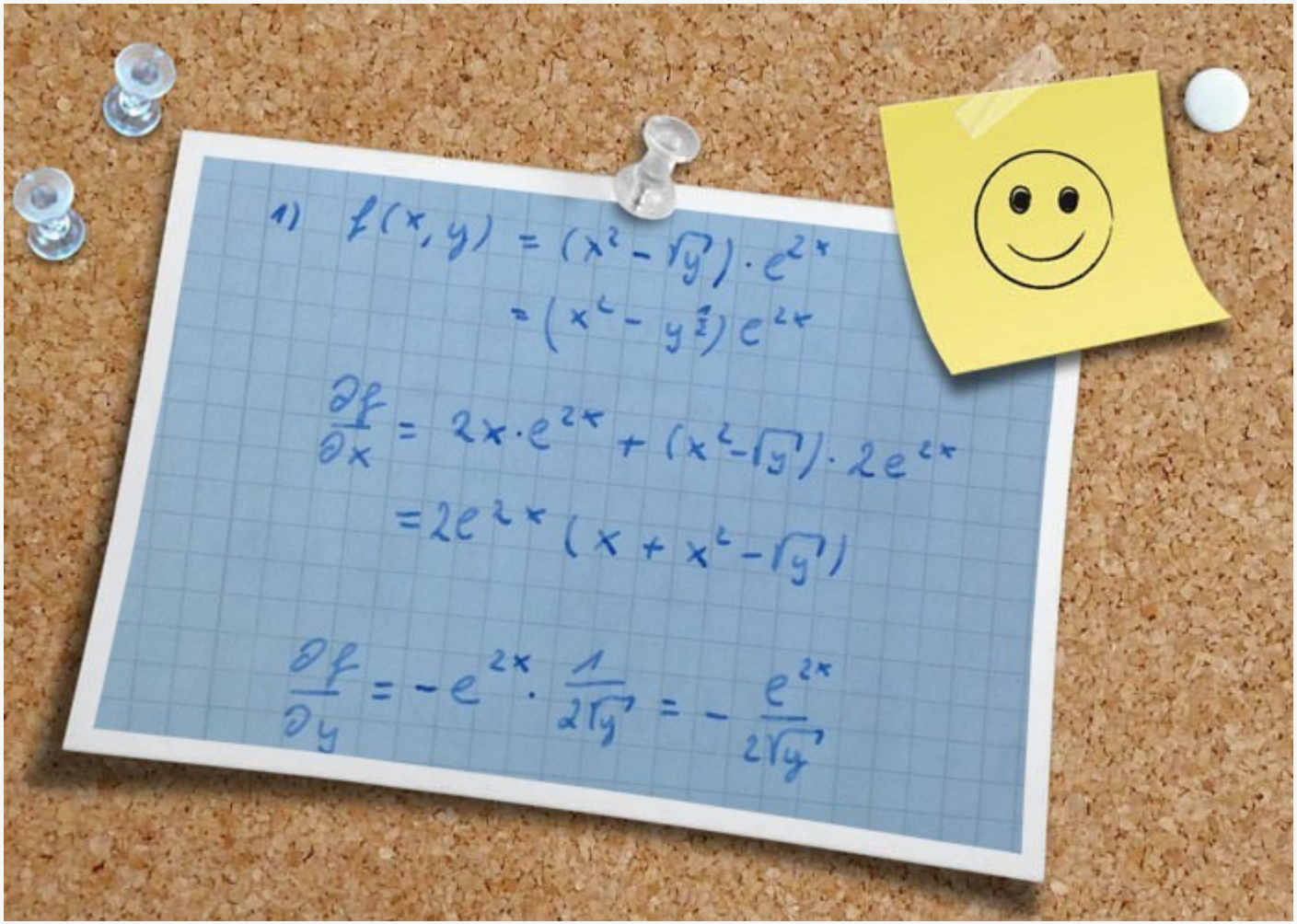
$$f(x,y) = (x^2 - y^{\frac{1}{2}}) \cdot e^{2x} = x^2 \cdot e^{2x} - y^{\frac{1}{2}} e^{2x}$$ Test

$$f_x = 2x \cdot e^{2x} + 2x^2 \cdot e^{2x} - 2\sqrt{y} \cdot e^{2x} = e^{2x} \cdot (2x + 2x^2 - 2\sqrt{y})$$

$$= e^{2x} \cdot (2x \cdot (1+x) - 2\sqrt{y})$$

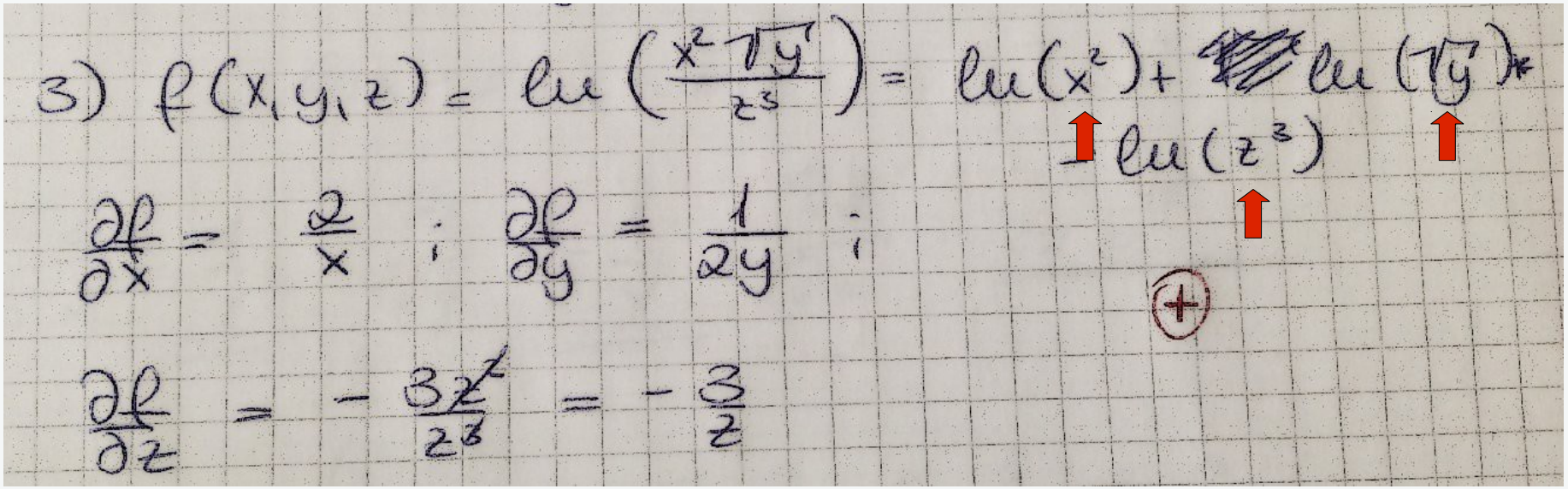
$$f_y = -\frac{1}{2} e^{2x} \cdot y^{-\frac{1}{2}} = \frac{-e^{2x}}{2\sqrt{y}}$$


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


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

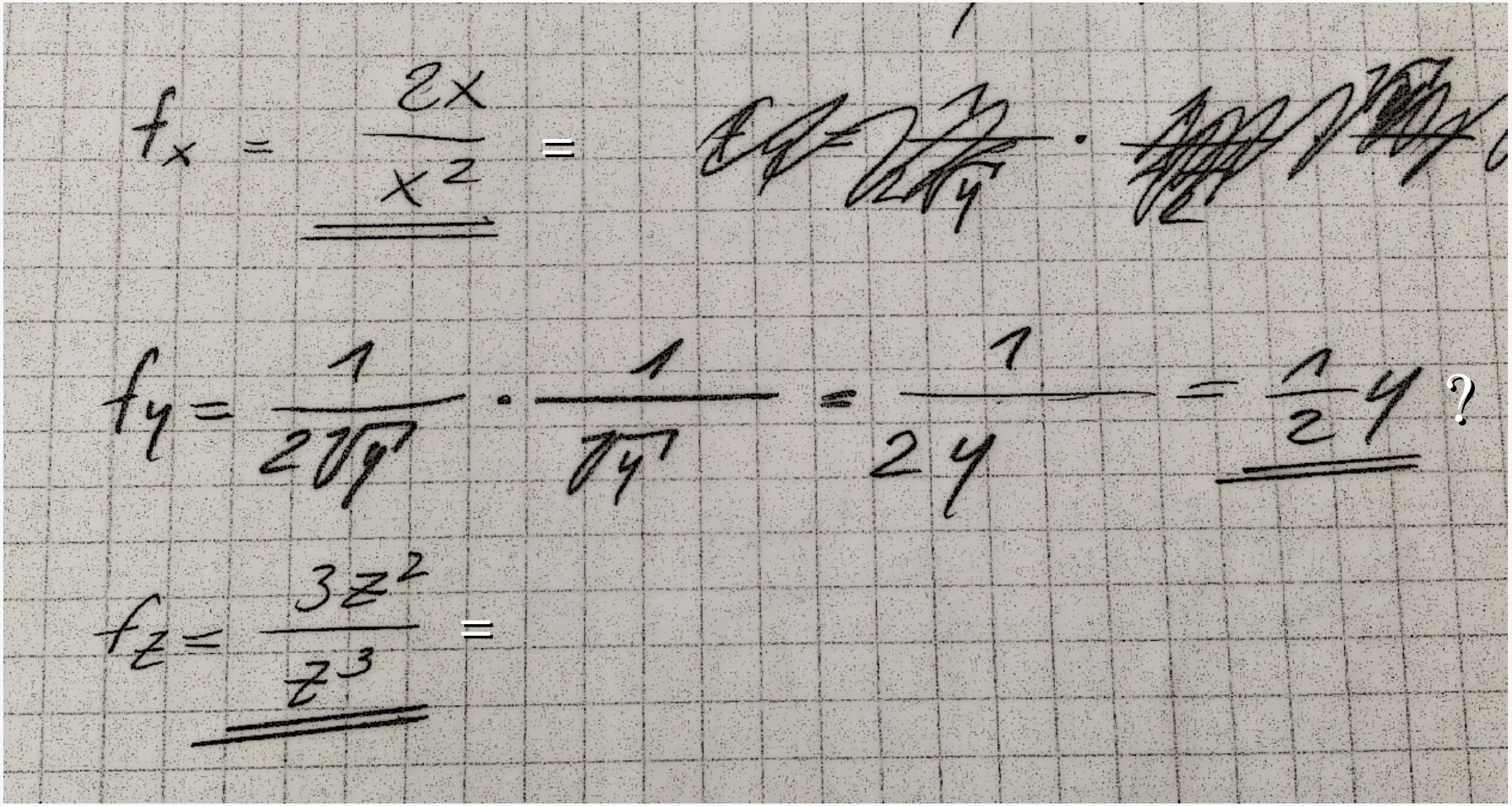
$$f(x, y, z) = \ln\left(\frac{x}{y}\right) + e^{-z^2} = \ln x - \ln y + e^{-z^2}$$

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



$$f(x, y, z) = \ln\left(\frac{x^2\sqrt{y}}{z^3}\right) = 2\ln x + \frac{1}{2}\ln y - 3\ln z$$

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


$f_x = \frac{2x}{x^2} =$
$f_y = \frac{1}{2\sqrt{y}} \cdot \frac{1}{\sqrt{y}} = \frac{1}{2y} = \frac{1}{2y}$?
$f_z = \frac{3z^2}{z^3} =$

$\partial z = x \ln x - y \ln y - 2z e^{-z}$

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

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

$\frac{\partial f}{\partial x} = x^2 \ln x^2 \cdot \sqrt{y} - \ln z^3$

∂y ? $= x^2 \ln x^2 \cdot \frac{1}{2\sqrt{y}} - \ln z^3$

∂z ? $= x^2 \ln x^2 \cdot \frac{1}{2y} - z^3 \ln z^3$

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

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

$$\frac{\partial f}{\partial x} = e^{\sin x}\frac{\partial}{\partial x}\sin x + \frac{\partial}{\partial x}\cos(x\,y) = \cos x\; e^{\sin x} - y\sin(x\,y)$$

$$\frac{\partial f}{\partial y} = -x\sin(x\,y)$$

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

$$\frac{\partial f}{\partial x} = y\frac{\partial}{\partial x}\,e^{x^2} = 2\,x\,y\;e^{x^2}, \qquad \frac{\partial f}{\partial y} = e^{x^2}$$