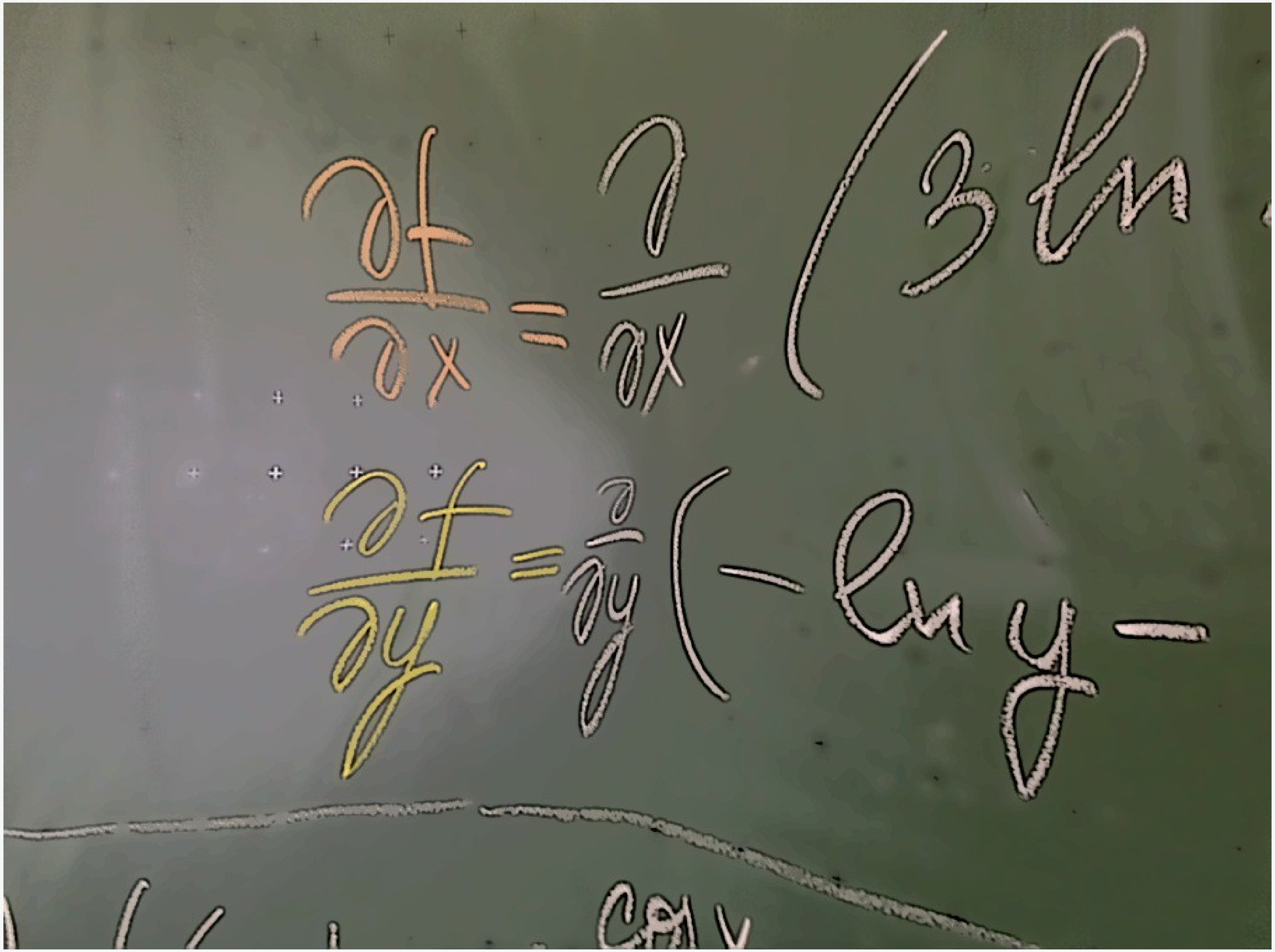


Partielle Ableitungen: Schriftliche Arbeit 3

Bestimmen Sie die partiellen Ableitungen 1. Ordnung der Funktion f

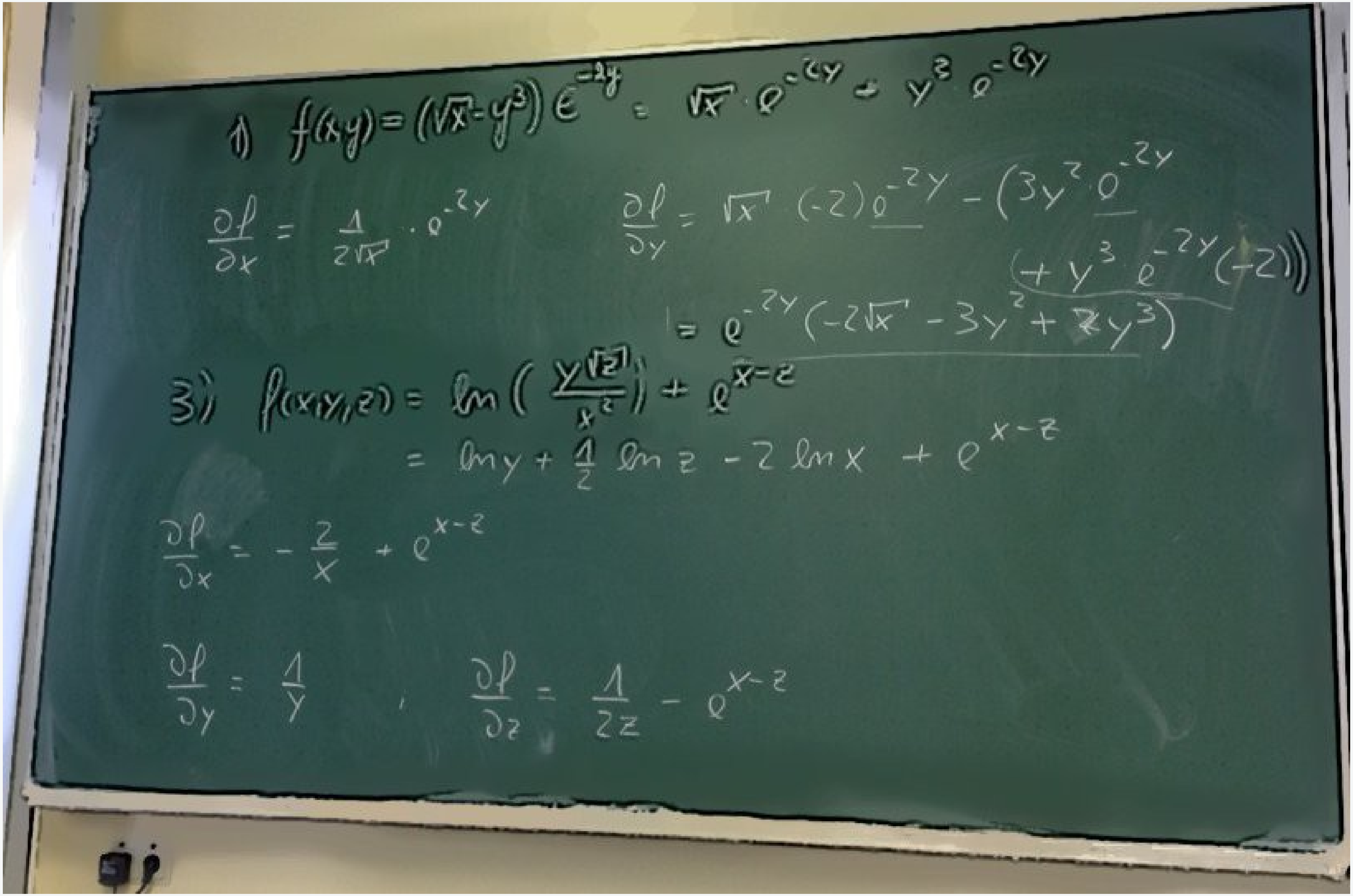
1) $f(x, y) = (\sqrt{x} - y^3)\, e^{-2y}$

2) $f(x, y) = \ln\left(\dfrac{x^3}{4y}\right) - e^{-y^2}$

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

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

5) $f(x, y) = e^{\ln z - xz}$


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

2) $$f(x,y) = \ln\left(\frac{x^3}{4y}\right) - e^{y^2} =$$

$$= \ln(x^3) - \ln(4y) - e^{y^2} = 3\ln x - (\ln 4 + \ln y) - e^{y^2} =$$

$$= \underline{3\ln x - \ln 4 - \ln y - e^{y^2}}$$

$$\frac{\partial f}{\partial x} = \frac{\partial}{\partial x}\left(3\ln x\right) = 3\frac{\partial}{\partial x}(\ln x) = \frac{3}{x},$$

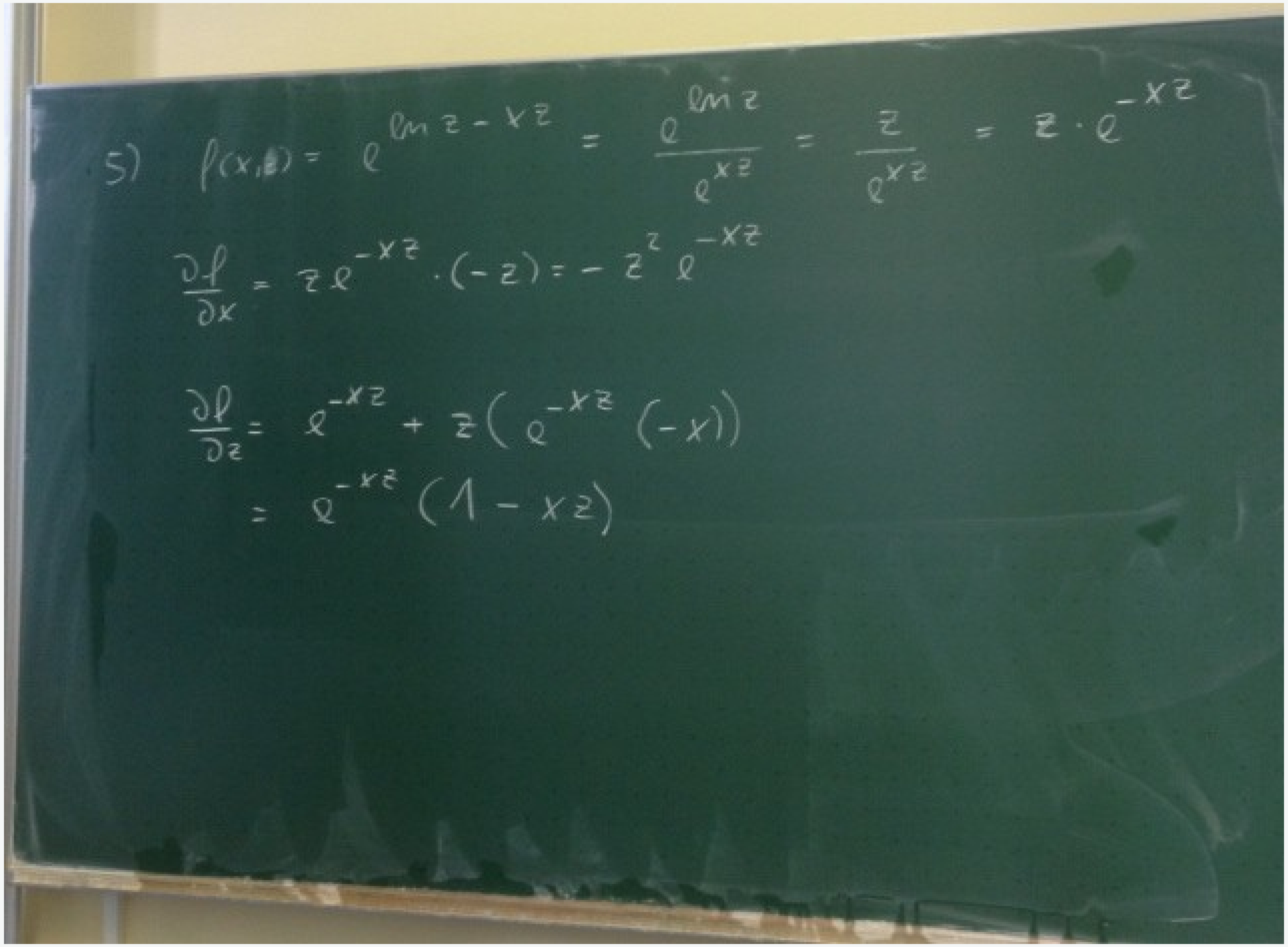
$$\frac{\partial f}{\partial y} = \frac{\partial}{\partial y}\left(-\ln y - e^{y^2}\right) = -\frac{1}{y} - 2y e^{y^2}$$

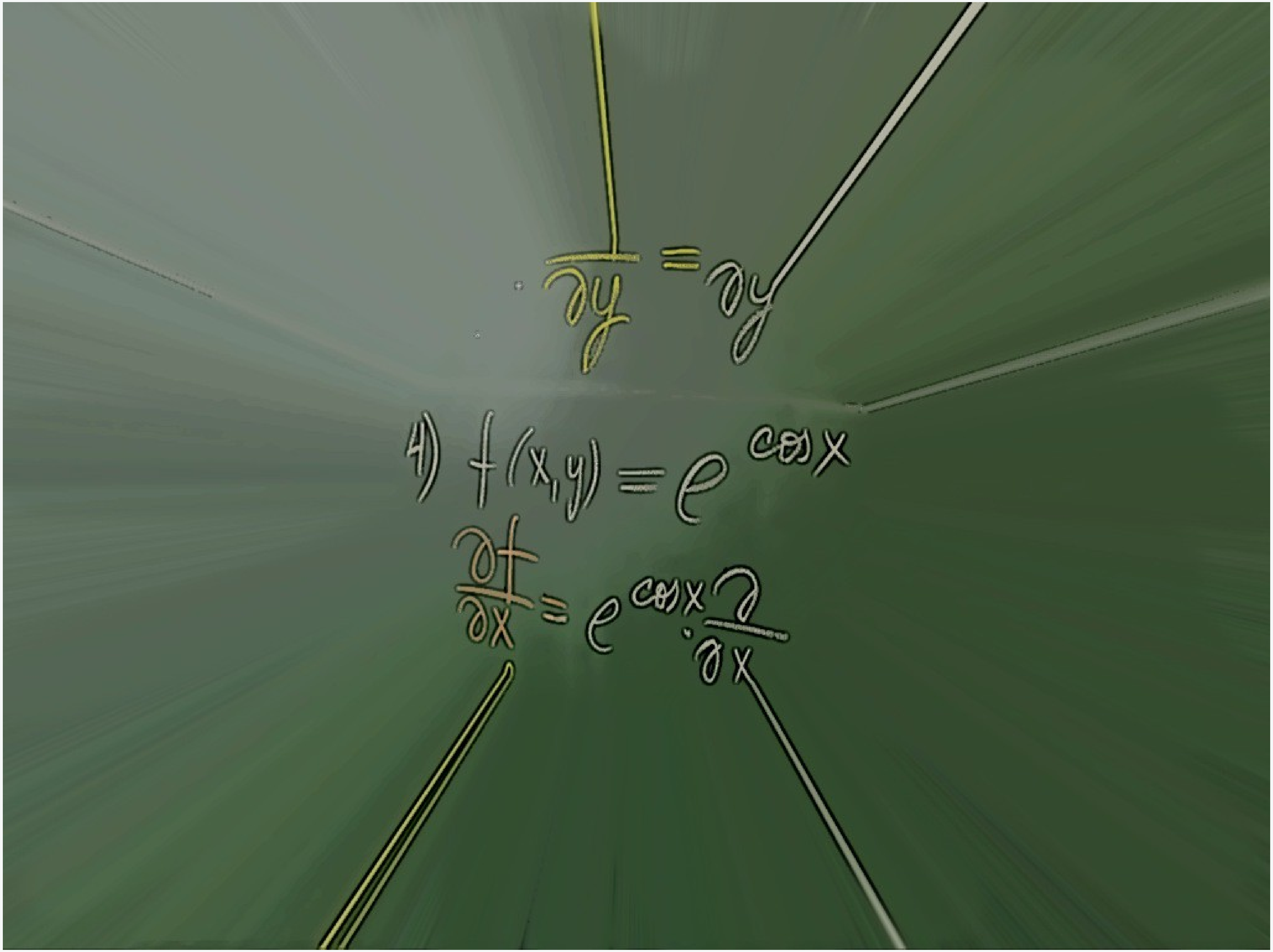
4) $$f(x,y) = e^{\cos x} + y \cdot \sin(e^x)$$

$$\frac{\partial f}{\partial x} = e^{\cos x} \cdot \frac{\partial}{\partial x}(\cos x) + y \cdot \frac{\partial}{\partial x}\left(\sin(e^x)\right) = -\sin x \cdot e^{\cos x} + y \cdot \cos(e^x) \cdot e^x =$$

$$= -\sin x \cdot e^{\cos x} + y\, e^x \cos(e^x)$$

$$\frac{\partial f}{\partial y} = \sin(e^x)\frac{\partial}{\partial y}(y) = \sin(e^x).$$


5) $f(x,z) = e^{\ln z - xz} = \frac{e^{\ln z}}{e^{xz}} = \frac{z}{e^{xz}} = z \cdot e^{-xz}$
$\frac{\partial f}{\partial x} = z e^{-xz} \cdot (-z) = -z^2 e^{-xz}$
$\frac{\partial f}{\partial z} = e^{-xz} + z\left(e^{-xz}(-x)\right)$
$= e^{-xz}(1 - xz)$


$\frac{\quad}{\partial y} = \partial y$
$4)\ f(x,y) = e^{\cos x}$
$\frac{\partial f}{\partial x} = e^{\cos x} \cdot \frac{\partial}{\partial x}$