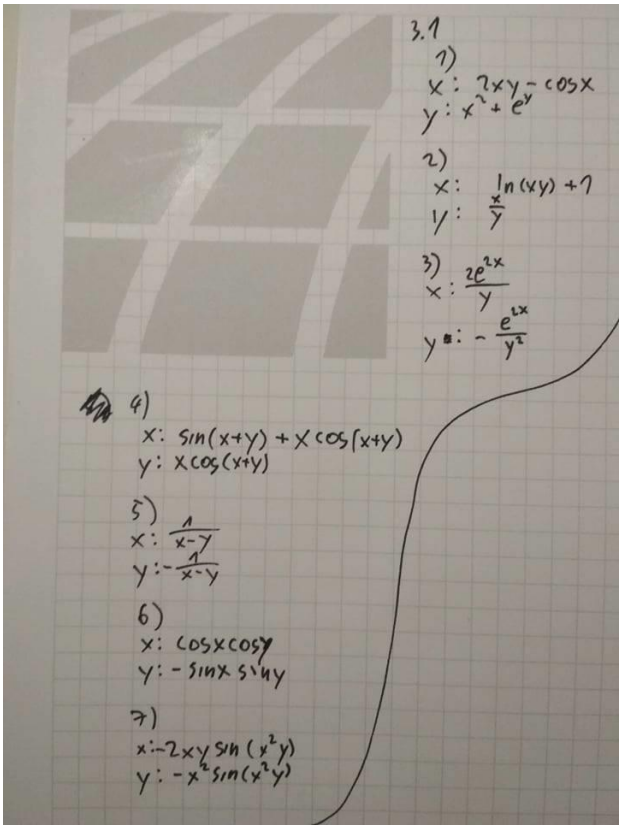
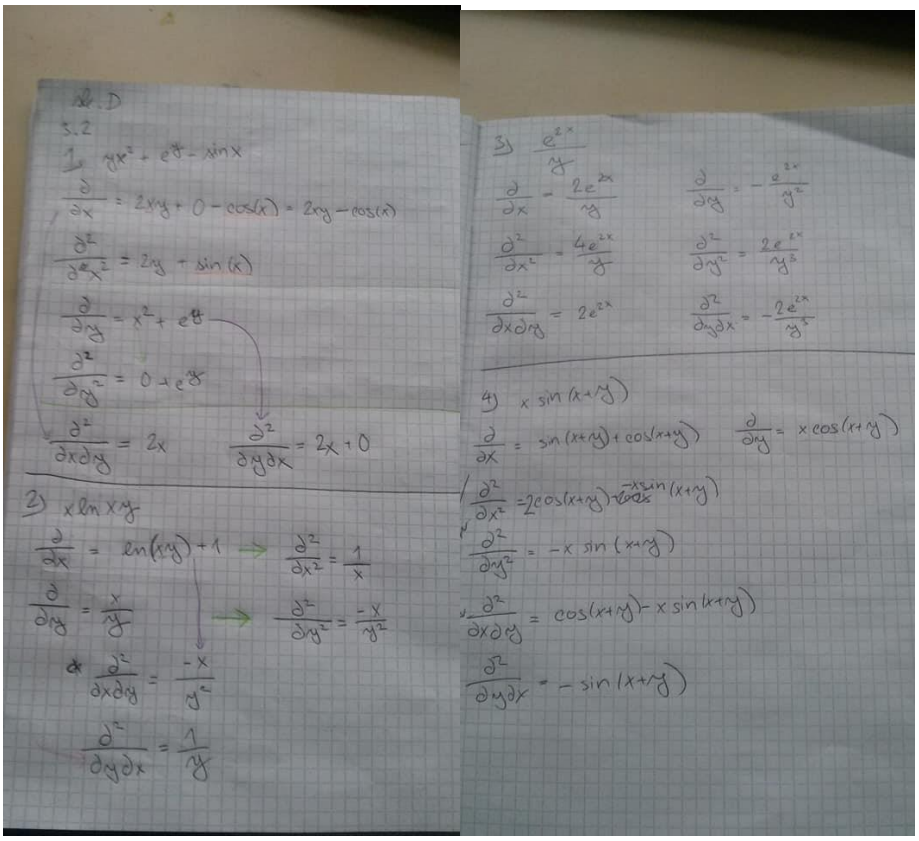
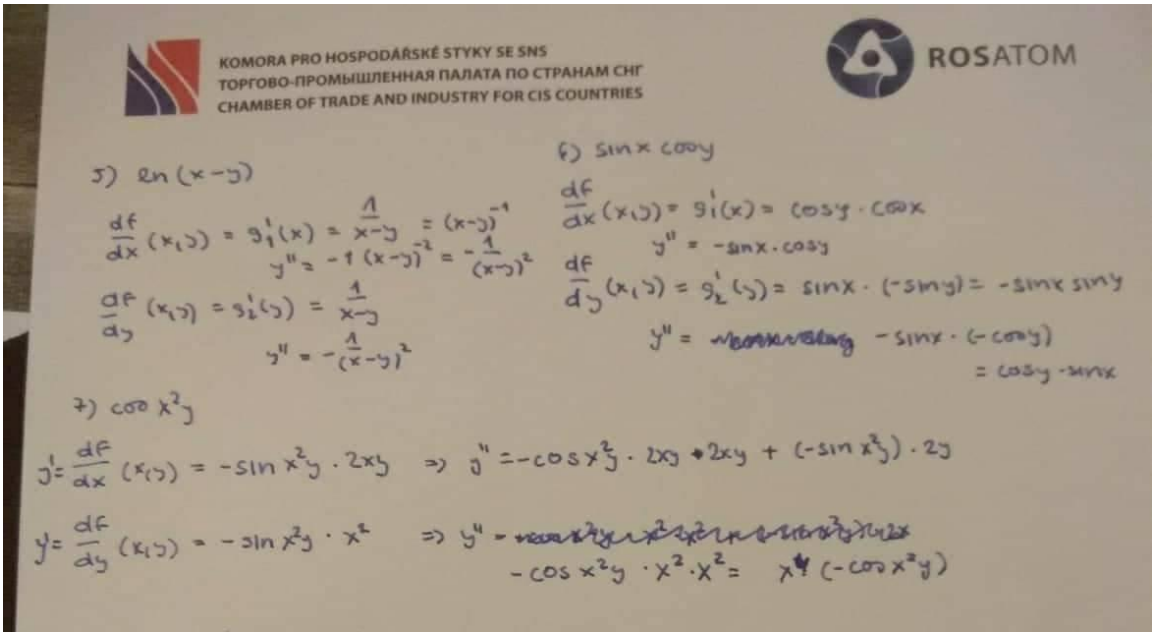
Skupina D

PŘ.: 3.1

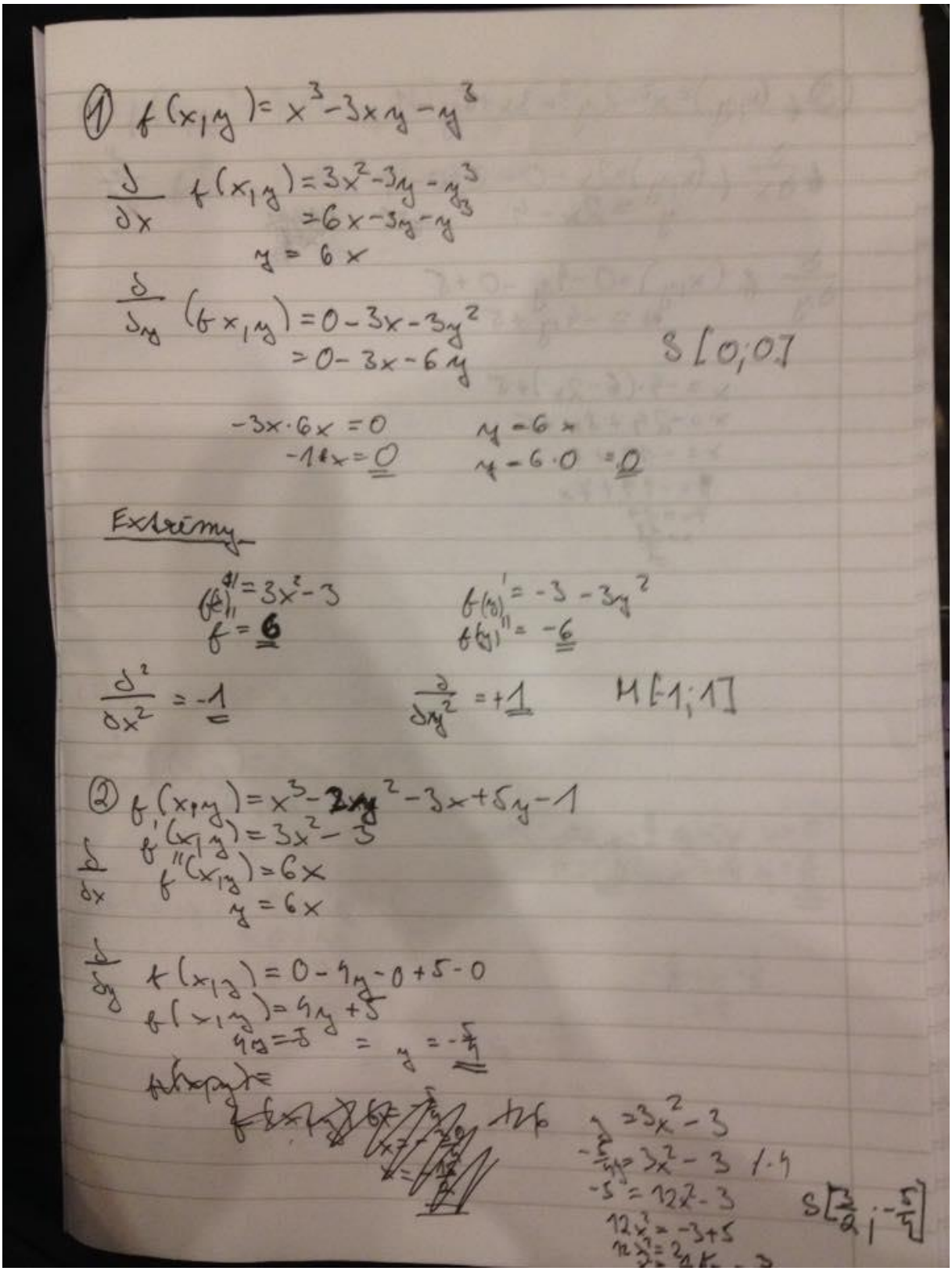


PŘ.: 3.2


3.2
1) $yx^2 + e^y - \sin x$
$\frac{\partial}{\partial x} = 2xy + 0 - \cos(x) = 2xy - \cos(x)$
$\frac{\partial^2}{\partial x^2} = 2y + \sin(x)$
$\frac{\partial}{\partial y} = x^2 + e^y$
$\frac{\partial^2}{\partial y^2} = 0 + e^y$
$\frac{\partial^2}{\partial x \partial y} = 2x$
$\frac{\partial^2}{\partial y \partial x} = 2x + 0$
2) $x \ln xy$
$\frac{\partial}{\partial x} = \ln(xy) + 1 \rightarrow \frac{\partial^2}{\partial x^2} = \frac{1}{x}$
$\frac{\partial}{\partial y} = \frac{x}{y} \rightarrow \frac{\partial^2}{\partial y^2} = \frac{-x}{y^2}$
$\frac{\partial^2}{\partial x \partial y} = \frac{-x}{y^2}$
$\frac{\partial^2}{\partial y \partial x} = \frac{1}{y}$
3) $\frac{e^{2x}}{y}$
$\frac{\partial}{\partial x} = \frac{2e^{2x}}{y}$
$\frac{\partial}{\partial y} = -\frac{e^{2x}}{y^2}$
$\frac{\partial^2}{\partial x^2} = \frac{4e^{2x}}{y}$
$\frac{\partial^2}{\partial y^2} = \frac{2e^{2x}}{y^3}$
$\frac{\partial^2}{\partial x \partial y} = 2e^{2x}$
$\frac{\partial^2}{\partial y \partial x} = -\frac{2e^{2x}}{y^2}$
4) $x \sin(x+y)$
$\frac{\partial}{\partial x} = \sin(x+y) + \cos(x+y)$
$\frac{\partial}{\partial y} = x\cos(x+y)$
$\frac{\partial^2}{\partial x^2} = 2\cos(x+y) - x\sin(x+y)$
$\frac{\partial^2}{\partial y^2} = -x\sin(x+y)$
$\frac{\partial^2}{\partial x \partial y} = \cos(x+y) - x\sin(x+y)$
$\frac{\partial^2}{\partial y \partial x} = -\sin(x+y)$


KOMORA PRO HOSPODÁŘSKÉ STYKY SE SNS
ТОРГОВО-ПРОМЫШЛЕННАЯ ПАЛАТА ПО СТРАНАМ СНГ
CHAMBER OF TRADE AND INDUSTRY FOR CIS COUNTRIES
ROSATOM
5) $\ln(x-y)$
$\frac{df}{dx}(x,y) = g_1'(x) = \frac{1}{x-y} = (x-y)^{-1}$
$y'' = -1(x-y)^{-2} = -\frac{1}{(x-y)^2}$
$\frac{df}{dy}(x,y) = g_2'(y) = \frac{1}{x-y}$
$y'' = -\frac{1}{(x-y)^2}$
6) $\sin x \cos y$
$\frac{df}{dx}(x,y) = g_1'(x) = \cos y \cdot \cos x$
$y'' = -\sin x \cdot \cos y$
$\frac{df}{dy}(x,y) = g_2'(y) = \sin x \cdot (-\sin y) = -\sin x \sin y$
$y'' = -\sin x \cdot (-\cos y)$
$= \cos y \cdot \sin x$
7) $\cos x^2 y$
$y' = \frac{df}{dx}(x,y) = -\sin x^2 y \cdot 2xy \Rightarrow y'' = -\cos x^2 y \cdot 2xy + 2xy + (-\sin x^2 y) \cdot 2y$
$y = \frac{df}{dy}(x,y) = -\sin x^2 y \cdot x^2 \Rightarrow y''$
$-\cos x^2 y \cdot x^2 \cdot x^2 = x^4(-\cos x^2 y)$

PŘ.: 3.3 (zřejmě ne zcela hotový, nevěděli jsme jak na to)



③ $f(x,y) = x^2 - 2y^2 - 3x + 5y - 1$

$\frac{\partial}{\partial x} f(x,y) = 2x - 0 - 3 + 0 - 1$

$y = 2x - 4 \qquad y = 0$

$\frac{\partial}{\partial y} f(x,y) = 0 - 4y - 0 + 5$

$x = -4y + 5$

$x = -4 \cdot (6 - 2x) + 5$

$x = -24 + 8x + 5$

$x = -19 + 8x$

$0 = -19 + 7x$

$7x = 19$

$x = \frac{19}{7}$

④ $f(x,y) = 3\cdot(x^2-y^2)^2 = 3\cdot(x^4-2x^2y^2+y^4)$
$= 3x^4 - 6x^2y^2 + 12y^4$

$\frac{\partial}{\partial x} f(x,y) =$ [illegible]

$= 12x -$

⑤ $f(x,y) = x^2y - 2xy + x$

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

$2y = 2x + 1 \quad |:2$

$y = x + \frac{1}{2}$

$y=0 \quad 0 = x + \frac{1}{2} \quad y = 0 \quad x = 0$

$x = -\frac{1}{2} \quad x = -\frac{1}{2} \quad y = \frac{1}{2}$

$\frac{\partial}{\partial y} f(x,y) = 0 + 2y + 0$

$= 0 + 2y$

$= 0 + 2\cdot(x+\frac{1}{2})$

$= 0 + 2x + 1$

$2x = 1 \quad = -\frac{1}{2}$

$-\frac{1}{2} = x + \frac{1}{2}$

$= 1$

$y = -\frac{1}{2}$

$S\left[0; \frac{1}{2}\right]$ i $S\left[2; -\frac{1}{2}\right]$

⑥ $f(x,y) = x^2 + xy + y^2 + 9x + 6y$

$\frac{\partial}{\partial x} f(x,y) = 2x + y + 0 + 9 + 0$

$= 2x + y + 9$

$-y = 2x + 9$

$y = \underline{\underline{-2x - 9}}$

$\frac{\partial}{\partial y} f(x,y) = 0 + x + 2y + 0 + 6$

$= 0 + x + 2 \cdot (-2x - 9) + 6$

$= x + (-4x - 18) + 6$

$= x - 4x - 12$

$= -3x - 12$

$3x = -12 \quad | : 3$

$x = \underline{\underline{-4}}$

$y = -2 \cdot (-4) - 9$

$y = 8 - 9$

$y = \underline{\underline{-1}}$

$S[-4, -1]$

$\frac{\partial^2}{\partial x^2} =$

④ $f(x,y) = x^3 - 3x^2 + y^3 - 3y + 1$

$\frac{\partial}{\partial x} f(x,y) = 3x^2 - 6x + 0 - 0 + 0$

$0 = 3x^2 - 6x$

$\frac{\partial}{\partial y} f(x,y) = 0 - 0 + 2y^2 - 3 + 0$

$0 = 2y^2 - 3$

$2y^2 = 3$

$y^2 = \frac{3}{2}$

$\frac{\partial^2}{\partial x} f''(x,y) = 6x - 6$

$6x = 6$

$x = 1$

$\frac{\partial}{\partial y} f''(x,y) = 4y$

$0 = 1 - 3 + y^2 - 3y + 1$

$0 = -1 + y^2 - 3y$

$0 = y^2 - 3y - 1$