Rešitve petnajste domače naloge

1. (a) $\left\{(x,y)\in\mathbb{R}^2\colon \left(y>\frac{2}{\pi}x,\ y>-\frac{2}{\pi}x,\ y>0\right)\vee\left(y<\frac{2}{\pi}x,\ y<-\frac{2}{\pi}x,\ y<0\right)\right\}$

   (b) $\bigcup_{k\in\mathbb{N}_0}\{(x,y)\in\mathbb{R}^2\colon x^2+y^2\in[2\pi k,2\pi k+\pi]\}$

   (c) $\{(x,y)\in\mathbb{R}^2\colon y>-x\}$

   (d) $\{(x,y)\in\mathbb{R}^2\colon x\in(-\infty,-2]\cup[2,\infty),\ y\in[-2,2]\}$

2.

3. (a) $[0,\infty)$

   (b) Nivojnice so krožnice s središčem v $(1,0)$.

   (c) $x=1$: Funkcija $f_1:\mathbb{R}\to\mathbb{R}, f_1(y):=|y|$.
   $y=0$: Funkcija $g_0:\mathbb{R}\to\mathbb{R}, g_0(x):=|x-1|$.

   (d) Graf je stožec z vrhom v $(1,0)$.

4.
$$\frac{\partial^2 g(x,y)}{\partial x\partial x}=f''(xf(y))f(y)^2,$$
$$\frac{\partial^2 g(x,y)}{\partial y\partial x}=\frac{\partial^2 g(x,y)}{\partial x\partial y}=f'(y)f'(xf(y))+xf(y)f'(y)f''(xf(y)),$$
$$\frac{\partial^2 g(x,y)}{\partial y\partial y}=x^2f'(y)^2f''(xf(y))+xf''(y)f'(xf(y))$$

5.
$$\begin{aligned}
h''(x) &= \left(2x+1\right)^2\cos^2(x(x+1))\,\frac{\partial^2 F}{\partial x_2\partial x_2}\left(e^x x,\sin(x(x+1))\right)\\
&- \left(\left(2x+1\right)^2\sin(x(x+1))-2\cos(x(x+1))\right)\frac{\partial F}{\partial x_2}\left(e^x x,\sin(x(x+1))\right)\\
&+ e^x(x+2)\frac{\partial F}{\partial x_1}\left(e^x x,\sin(x(x+1))\right)\\
&+ \left(e^x(x+1)\right)^2\frac{\partial^2 F}{\partial x_1\partial x_1}\left(e^x x,\sin(x(x+1))\right)\\
&+ 2e^x(x+1)(2x+1)\cos(x(x+1))\frac{\partial^2 F}{\partial x_1\partial x_2}\left(e^x x,\sin(x(x+1))\right)
\end{aligned}$$

6. (a) e^3

(b) 0

(c) Ne obstaja (V točkah (x, x^2) izraz ni definiran.)

(d) Ne obstaja (V točkah $(x, -\sqrt[3]{\frac{x^2}{3}})$ izraz ni definiran.)

7. (a) $1 \cdot 1 + (3 \cdot 1 \cdot 1) \cdot (0,02) + (2 \cdot 1 \cdot 1)(-0,03) = 1$

   (b) $\sin(\frac{\pi}{6})\cos(\frac{\pi}{3}) + \cos(\frac{\pi}{6})\cos(\frac{\pi}{3})(2\pi/180) - \sin(\frac{\pi}{6})\sin(\frac{\pi}{3})(-\pi/180) = \frac{1+\pi 3\sqrt{3}}{4 \cdot 180}$

8. $\frac{4}{5} \cdot 0,2 + \frac{3}{5} \cdot (-0,1) = \frac{1}{10}$

9. Zvezna in diferenciabilna je na $\mathbb{R}^2$.