1Ди ФНП

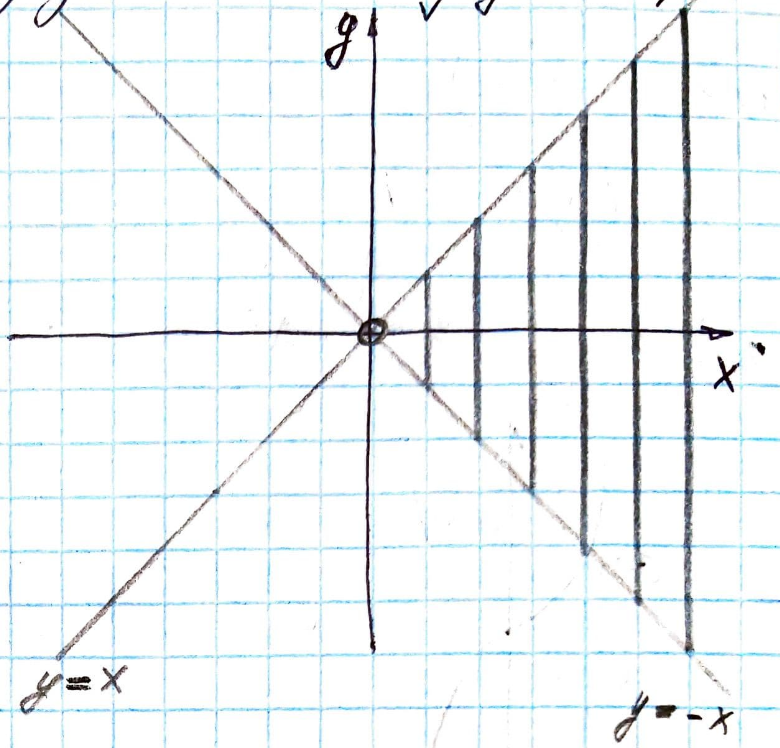
ДЗ (текущее) 27.04.2020

№ 1792 (е, и) Найти и изобразить области существ-я ф-ий

е) $z = \arcsin \frac{y}{x}$

$$\begin{cases} -1 \le \frac{y}{x} \le 1 \\ x \ne 0 \end{cases} \Rightarrow \begin{cases} -x \le y \le x \\ x \ne 0 \end{cases}$$

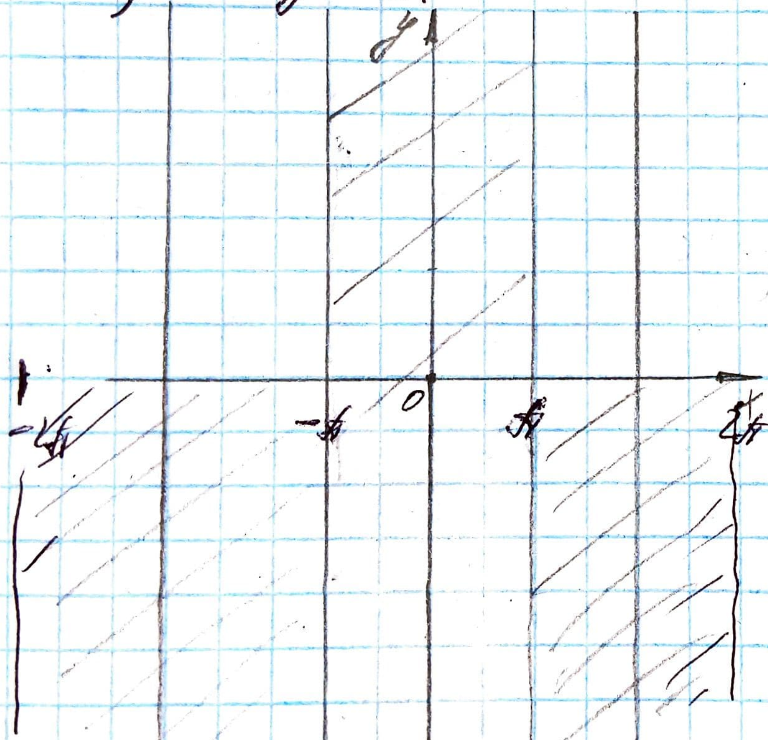
$$\begin{cases} \begin{cases} y \le x \\ y \ge -x \end{cases} \\ x \ne 0 \end{cases}$$



и) $z = \sqrt{y \cdot \sin x}$

$y \cdot \sin x \ge 0 \Rightarrow$

$$\left[\begin{array}{l} \begin{cases} y \ge 0 \\ \sin x \ge 0 \end{cases} \\ \begin{cases} y \le 0 \\ \sin x \le 0 \end{cases} \end{array} \right.$$



№ 1793 (б, в)

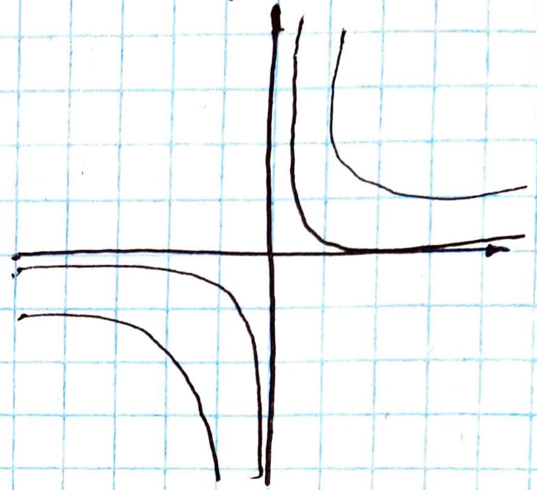
б) $u = \ln(xyz)$ $xyz > 0 \Rightarrow \begin{cases} x \ne 0 \\ y \ne 0 \\ z \ne 0 \end{cases}$

в) $u = \arcsin x + \arcsin y + \arcsin z \Rightarrow \begin{cases} x \geq 0 \\ y \geq 0 \\ z \geq 0 \end{cases}$

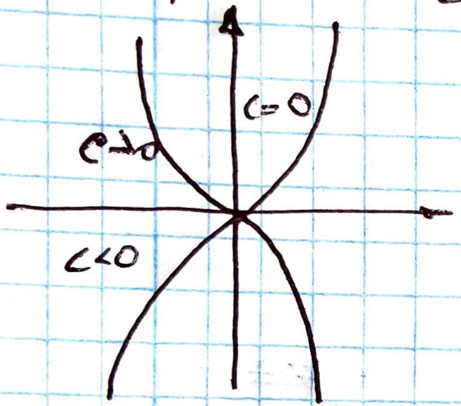
w1794 (г, ж) Построить линии уровня данных ф.

г) $z = \sqrt{x \cdot y}$ $\quad \sqrt{xy} = C$

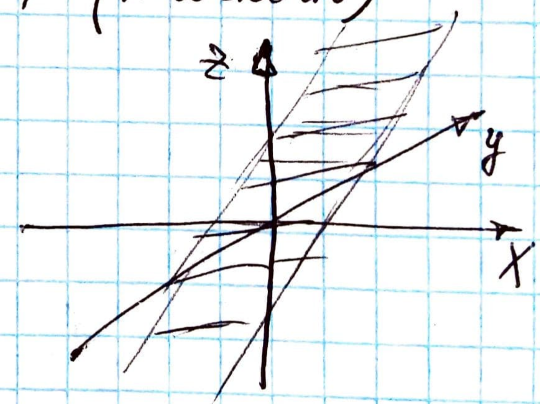
$xy = C$



ж) $z = \frac{y}{x^2}$ $\quad y = \frac{x^2}{c}$

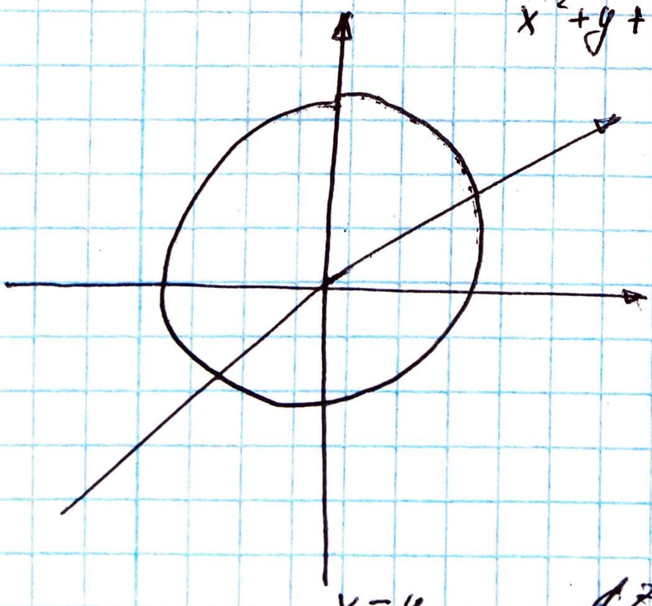


w1796 а) $u = x + y + z$ $\quad x + y + z = C$ (плоскость)



w1796 в) $u = x^2 + y^2 + z^2$ (шар)

$x^2 + y^2 + z^2 = (\sqrt{C})^2$



w1802. $z = \frac{x-y}{x+y} \rightarrow \frac{dz}{dx} = \frac{2y}{(x+y)^2} \Rightarrow \frac{dz}{dx} = -\frac{2x}{(x+y)^2}$

w1804 $z=\sqrt{x^2+y^2}$ $\frac{dz}{dx}=\frac{x}{\sqrt{x^2+y^2}}$ $\frac{dz}{dy}=\frac{y}{\sqrt{x^2+y^2}}$

w1806 $z=\ln\left(x+\sqrt{x^2+y^2}\right)$

$\frac{dz}{dx}=\frac{x}{\ln\left(x+\sqrt{x^2+y^2}\right)'}=\frac{1}{\sqrt{x^2+y^2}}$

$\frac{dz}{dy}=\frac{\sqrt{x^2+y^2}-x}{y\cdot\sqrt{x^2+y^2}}$

w1808 $z=x^y$ $\frac{dz}{dx}=$ ~~$1/+++$~~ $x^y \cdot \ln x$

w1810 $z=\arcsin\sqrt{\frac{x^2-y^2}{x^2}}$ $\frac{dz}{dx}=\frac{y^2}{|y|\cdot x\cdot\sqrt{x^2-y^2}}$ $\frac{dz}{dy}=\frac{-y|x|}{x|y|\sqrt{x^2-y^2}}$

w1812 $u=(xy)^z$ $\frac{\partial u}{\partial x}=y\cdot\ln(z)\cdot z^{xy}$ $\frac{\partial u}{\partial z}=xy\cdot z^{(xy-1)}$

w1814. Найти $f'_x(2;1)$ и $f'_y(2;1)$, если $f(x;y)=\sqrt{xy+\frac{x}{y}}$

$f'_x=\frac{1}{2}\cdot\left(x\cdot y+\frac{x}{y}\right)^{-\frac{1}{2}}\cdot\left(y+\frac{1}{y}\right)=\frac{1}{2\sqrt{2}}$

$f'_y=0$

w1816 Проверить т. Эйлера об однородных ф-циях

$f(x;y)=A\cdot x^2+2\cdot B\cdot x\cdot y+C\cdot y^2$

$t\left(A\cdot x^2+2\cdot B\cdot x\cdot y+C\cdot y^2\right)=\frac{df}{dx}x+\frac{df}{dy}y=2\cdot Ax^2+2Bx\cdot y+2Bxy+$

$+2Cy^2$ $t=2$

w1818. $f(x;y)=\frac{x+y}{\sqrt[3]{x^2+y^2}}$

$t\cdot\frac{x+y}{\sqrt[3]{x^2+y^2}}=\frac{x+y}{\sqrt[3]{\sqrt[3]{x^2+y^2}}}$ $t=1/3$

№1820 Найти $\frac{\partial}{\partial x}\left(\frac{1}{r}\right)$, где $r=\sqrt{x^2+y^2+z^2} \Rightarrow \frac{\partial}{\partial x}\left(\frac{1}{\sqrt{x^2+y^2+z^2}}\right)=$

$$=\frac{x}{(x^2+y^2+z^2)^{3/2}}$$

№1822 $x\frac{dz}{dx}+y\cdot\frac{dz}{dy}=2 \Rightarrow z=\ln(x^2+xy+y^2) \Rightarrow$

$$\Rightarrow \frac{2x^2+yx}{x^2+xy+y^2}+\frac{2y^2+yx}{x^2+xy+y^2}=2$$

№1824 $u=(x-y)(y-z)(z-x) \Rightarrow (-2xy-z^2+2xy+y^2)+(y^2-y^2+$

$+2yz-2xz)+(z^2+2xy-2yz-x^2)=0$

№1838 $z=\ln(x^2+y^2)$ $\quad dz=\frac{2x}{x^2+y^2}dx+\frac{2y}{x^2+y^2}dy=\frac{2}{x^2+y^2}(dx+dy)$

№1840. $z=\operatorname{arctg}\frac{x}{y}+\operatorname{arctg}\frac{y}{x}$

$$dz=\frac{1}{1+\left(\frac{x}{y}\right)^2}dx+z_y^2dy=0$$

№1891. $\frac{d^2z}{dx^2}=\frac{abcy^2}{\sqrt{(x^2b^2+a^2y^2)^3}}$ $\quad \frac{dz}{dy^2}=\frac{abcx^2}{\sqrt{(b^2x^2+a^2y^2)^3}}$

№1898 $z=\sin x$ $\quad \frac{dz}{dxdy}=\frac{d}{dy}(-\sin(xy)\cdot xy+\cos(xy))=$

$$=-2\sin(xy)\cdot x-x^2y\cdot\cos(xy)$$

№ 1916 $\quad z = e^{xy}$

$$d^2z = \frac{d^2z}{dx^2}dx^2 + 2\frac{d^2z}{dxy}dxdy + \frac{d^2z}{dy(dy)^2} = y^2 \cdot e^{xy} + e^{xy}dx + xy \cdot e^{xy} =$$

$$= 4xdy + x^2e^{xy}dx^2$$

№ 1925. $\quad f(x,y,z) = x^2 + 2y^2 + 3z^2 + 2xy + 4xz + 2yz$

$$d^2f(x,y,z) = \frac{d^2f}{dx^2}dy^2 + \frac{d^2f}{dy^2}dy^2 + \frac{d^2f}{dz^2}dz^2 + 2\frac{d^2f}{dx}dxdt +$$

$$+ 2\frac{df}{dopz}dyrv + 2\frac{df}{d^2f1}dz2ft.$$

$$df = 2dx^2 + 4dy^2 + 6dz^2 + 4dydz - 4dxdy + 8dxdz$$