$$\frac{\partial^2 f}{\partial x \partial y} = -x\cdot\left(-\frac{3}{2}\right)\frac{1}{(x^2+y^2+z^2)^{\frac{5}{2}}}\cdot 2y = \frac{3xy}{(x^2+y^2+z^2)^{\frac{5}{2}}}$$

ОСТАЛЬНОЕ ПО АНАЛОГИИ

2.3.1.

$$\frac{\partial^3 u}{\partial^2 x \partial y} \qquad u = x\ln x\, y \qquad \frac{\partial u}{\partial x} = y(\ln x + 1).$$

$$\frac{\partial^2 u}{\partial^2 x} = \frac{y}{x} \qquad \frac{\partial^3 u}{\partial^2 x \partial y} = \frac{1}{x}.$$

2.5.2

$$\partial^3 u \qquad u = \sin(x^2+y^2)$$

$$\frac{\partial u}{\partial x} = \cos(x^2+y^2)\cdot 2x \quad ; \quad \frac{\partial^2 u}{\partial x^2} = -\sin(x^2+y^2)\cdot 2x\cdot 2x + 2\cos(x^2+y^2) =$$

$$= 2\cos(x^2+y^2) - 4x^2\sin(x^2+y^2)$$

$$\frac{\partial^3 u}{\partial x^3} = -2\sin(x^2+y^2)\cdot 2x - 4\left(\sin(x^2+y^2) + \cos(x^2+y^2)\cdot 2x\cdot x\right) =$$

$$= \cancel{-8\sin(x^2+y^2)} \cancel{-8} \quad 2x\sin(x^2+y^2) + \cos(x^2+y^2)\cdot 2x\cdot x^2) =$$

$$= -2\sin(x^2+y^2)\cdot 2x - 8x\sin(x^2+y^2) - 8x^3\cos(x^2+y^2)$$

$$-12x\sin(x^2+y^2) - 8x^3\cos(x^2+y^2) =$$

$$= -4x\left(3\sin(x^2+y^2) + 2x^2\cos(x^2+y^2)\right)$$

$$\frac{\partial^3 u}{\partial x^2 \partial y} = -2\sin(x^2+y^2)\cdot 2y - 4x^2\cos(x^2+y^2)\cdot 2y =$$

$$= -4y\left(\sin(x^2+y^2) + 2x^2\cos(x^2+y^2)\right).$$

$$\partial^3 u = -4x\left(3\sin(x^2+y^2) + 2x^2\cos(x^2+y^2)\right)(\partial x)^3 - 12y\left(\sin(x^2+y^2) + 2x^2\cos(x^2+y^2)\right)(\partial x)^2\partial y$$

$$-12x\left(\sin(x^2+y^2) + 2y^2\cos(x^2+y^2)\right)\partial x(\partial y)^2 - 4y\left(3\sin(x^2+y^2) + 2y^2\cos(x^2+y^2)\right)(\partial y)^3$$