

$$\rho = 3(2 - \sin \varphi), \quad \rho \geq 0, \quad \varphi \in [0; 2\pi].$$

$$2 - \sin \varphi \geq 0 \quad \forall \varphi \in [0; 2\pi].$$

$$\varphi: 0 \rightarrow \frac{\pi}{2} \Rightarrow \rho: 6 \rightarrow 3 \quad \text{Спрямовані зовнішній графіка}$$

$$\varphi: \frac{\pi}{2} \rightarrow \frac{3\pi}{2} \Rightarrow \rho: 3 \rightarrow 9 \quad (\text{рис 4, 5, 6})$$

$$\varphi: \frac{3\pi}{2} \rightarrow 2\pi \Rightarrow \rho: 9 \rightarrow 6.$$

N24

$$z = \ln\left(1 + \frac{x}{y}\right) \Rightarrow \frac{\partial z}{\partial x} = \frac{1}{1 + \frac{x}{y}} \cdot \frac{1}{y} = \frac{1}{x+y}$$

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

$$z = 2x^2y + 3xy^2 + x^3 \quad \text{N25}$$

$$\frac{\partial z}{\partial x} = 4xy + 3y^2 + 3x^2 \quad \frac{\partial^2 z}{\partial y \partial x} = 4x + 6y$$

$$\frac{\partial z}{\partial y} = 2x^2 + 6xy$$

$$\frac{\partial^2 z}{\partial x \partial y} = 4x + 6y$$

$$\Rightarrow \frac{\partial^2 z}{\partial x \partial y} = \frac{\partial^2 z}{\partial y \partial x}$$

N26

$$u = -x^2 - 3y^2 - z^2 + xz + x - 6y + z$$

$$\begin{cases} \frac{\partial u}{\partial x} = -2x + z + 1 = 0 \\ \frac{\partial u}{\partial y} = -6y - 6 = 0 \\ \frac{\partial u}{\partial z} = -2z + x + 1 = 0 \end{cases} \Rightarrow \begin{cases} x = 1 \\ y = -1 \\ z = 1 \end{cases}$$

$$\frac{\partial^2 u}{\partial x^2} = -2; \quad \frac{\partial^2 u}{\partial y^2} = -6; \quad \frac{\partial^2 u}{\partial z^2} = -2; \quad \frac{\partial^2 u}{\partial x \partial y} = 0; \quad \frac{\partial^2 u}{\partial y \partial z} = 0; \quad \frac{\partial^2 u}{\partial x \partial z} = 1$$

$$\Rightarrow \Delta = \begin{vmatrix} -2 & 0 & 1 \\ 0 & -6 & 0 \\ 1 & 0 & -2 \end{vmatrix}; \quad \begin{aligned} \Delta_1 &= -2 < 0 \\ \Delta_2 &= -2 \cdot (-6) = 12 > 0 \\ \Delta_3 &= -24 + 6 = -18 < 0 \end{aligned}$$

$$\Rightarrow (1; -1; 1) - \text{точка максимуму}$$

