

$$N_4 (3(6+13) \bmod 54) + 1$$

$$f(x) = x_1^2 + x_2^2 + \frac{1}{2} x_3^2 + x_4^2 + x_1 x_2 - x_3 + 10; \quad X = \mathbb{R}^4$$

Проверка

$$\frac{\partial f}{\partial x_1} = 2x_1 + x_2$$

$$\frac{\partial^2 f}{\partial x_1^2} = 2$$

$$\frac{\partial^2 f}{\partial x_1 \partial x_2} = 1$$

$$\frac{\partial f}{\partial x_2} = 2x_2 + x_1$$

$$\frac{\partial^2 f}{\partial x_2^2} = 2$$

$$\frac{\partial^2 f}{\partial x_1 \partial x_2} = 1$$

$$\frac{\partial f}{\partial x_3} = x_3 - 1$$

$$\frac{\partial^2 f}{\partial x_3^2} = 1$$

$$\frac{\partial f}{\partial x_4} = 2x_4$$

$$\frac{\partial^2 f}{\partial x_4^2} = 2$$

$$\frac{\partial^2 f}{\partial x^2} = \begin{pmatrix} 2 & 1 & 0 & 0 \\ 1 & 2 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 2 \end{pmatrix}$$

$$\begin{aligned} \Delta_1 &= 2 \geq 0 \\ \Delta_2 &= 3 \geq 0 \\ \Delta_3 &= 3 \geq 0 \\ \Delta_4 &= 6 \geq 0 \end{aligned}$$

$\Rightarrow f(x)$ - выпуклая на X

Ответ: $f(x)$ является выпуклой на X (сторона выпуклости)