Исс-ть фун-ю на усл-й экст-м

① $U = 3 - 8x + 6y$, если $x^2 + y^2 = 36$

$L(\lambda_1, x, y) = 3 - 8x + 6y + \lambda_1 \cdot (x^2 + y^2 - 36)$

$L'_x = -8 + \lambda_1 \cdot 2x = 0 \quad x = 4/\lambda_1 = \pm\frac{24}{5}$

$L'_y = 6 + \lambda_1 \cdot 2y = 0 \quad y = -3/\lambda_1 = \pm\frac{18}{5}$

$L'_{\lambda_1} = x^2 + y^2 - 36 = 0$

$\frac{16}{\lambda_1^2} + \frac{9}{\lambda_1^2} = 36 \quad \lambda_1^2 = \frac{25}{36} \quad \lambda_1 = \pm\frac{5}{6}$

$L''_{xx} = 2\lambda_1 \quad L''_{yy} = 2\lambda_1 \quad L''_{\lambda_1\lambda_1} = 0$

$L''_{xy} = 0 \quad L''_{x\lambda_1} = 2x \quad L''_{y\lambda_1} = 2y$

$$\begin{vmatrix} 0 & 2x & 2y \\ 2x & 2\lambda_1 & 0 \\ 2y & 0 & 2\lambda_1 \end{vmatrix} = 0 \cdot \begin{vmatrix} 2\lambda_1 & 0 \\ 0 & 2\lambda_1 \end{vmatrix} - 2x \cdot \begin{vmatrix} 2x & 0 \\ 2y & 2\lambda_1 \end{vmatrix} +$$

$$+ 2y \cdot \begin{vmatrix} 2x & 2\lambda_1 \\ 2y & 0 \end{vmatrix} = 0 - 2x \cdot (2x \cdot 2\lambda_1 - 0) + 2y \cdot (0 - 2y \cdot 2\lambda_1)$$

$= -8x^2\lambda_1 - 8y^2\lambda_1 = -8\lambda_1(x^2 + y^2)$

min $\left(\frac{5}{6}; \frac{24}{5}; -\frac{18}{5}\right)$, $\left(-\frac{5}{6}; -\frac{24}{5}; \frac{18}{5}\right)$ max

$\lambda \quad x \quad y$

усл-и экст-м

...ии $x^2+y^2=36$

$+6y+\lambda_1\cdot$

$-36)$

$4/\lambda_1=\pm\frac{24}{5}$

$-3/\lambda_1=\pm\frac{18}{5}$

$\lambda_1=\pm\frac{5}{6}$

$_1=0$

$2y$

$-2x\cdot\begin{vmatrix}2x & 0\\ 2y & 2\lambda_1\end{vmatrix}+$

$_1-0)+2y\cdot(0-2y\cdot 2\lambda$

$\frac{24}{5};\ \frac{18}{5})$ max

② $U=2x^2+12xy+32y^2+15$, если $x^2+16y^2=64$

$\cancel{\frac{dz}{dx}=4x+12y}$

$\cancel{\frac{dz}{dy}=12x+64y}$

$L(\lambda_1,x,y)=2x^2+12xy+32y^2+15+\lambda_1\cdot(x^2+16y^2-64)$

$L'_x=4x+12y+\lambda_1\cdot 2x=0 \qquad x=\pm\sqrt{32}$

$L'_y=12x+64y+\lambda_1\cdot 32y=0 \qquad y=\pm\sqrt{2}$

$L'_{\lambda_1}=x^2+16y^2-64=0 \qquad \lambda_1=-\frac{1}{2};\ -\frac{7}{2}$

$L''_{xx}=4+2\lambda_1 \quad L''_{yy}=64+32\lambda_1 \quad L''_{\lambda_1\lambda_1}=0$

$L''_{xy}=12 \quad L''_{x\lambda_1}=2x \quad L''_{y\lambda_1}=32y$

$$\begin{vmatrix}0 & 2x & 32y\\ 2x & 4+2\lambda_1 & 12\\ 32y & 12 & 64+32\lambda_1\end{vmatrix}=-2x\begin{vmatrix}2x & 12\\ 32y & 64+32\lambda_1\end{vmatrix}+32y\begin{vmatrix}2x & 4+2\lambda_1\\ 32y & 12\end{vmatrix}$$

$=-16384-8192\lambda_1+1536xy$

$(-\frac{7}{2},\ 4\sqrt{2},\ \sqrt{2})$ max, $(-\frac{1}{2};\ 4\sqrt{2};\ -\sqrt{2})$ min, $(-\frac{1}{2};\ -4\sqrt{2};\ \sqrt{2})$ min,

$(-\frac{7}{2};\ -4\sqrt{2};\ -\sqrt{2})$ max