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|--------------------------------------|---------------------------|------|
| 20710-214                            | TUTTOETS 11 / TUT TEST 11 | 2023 |
| Voorl's en Van / Init's and Surname: | MEMO                      |      |
| Studentenommer/ Student number:      |                           |      |

Besluit of die kwadratiese kromme hieronder gegee 'n hiperbool of ellips is, en bereken dan die lengtes van die hoofasse en die rotasie-hoek. Maak dan 'n vryhand-skets waarop al die inligting aangedui is.

Decide whether the quadratic curve given below is a hyperbola or an ellipse, and then calculate the lengths of the semi-axes, and the rotation angle. Then draw a rough figure showing all the relevant information.

$$7.4x^2 - 6.4xy + 2.6y^2 = 9$$

Wenk/Hint:  $\mathbf{u}^T \mathbf{A} \mathbf{u} = d$ ,  $a = \sqrt{d/\lambda_1}$ ,  $\sin \theta = -Q_{12}$

$$A = \begin{bmatrix} 7.4 & -3.2 \\ -3.2 & 2.6 \end{bmatrix}$$

$$\lambda^2 - 10\lambda + 9 = 0, \therefore \lambda_1 = 9, \lambda_2 = 1$$

$$\lambda_1 = 9: \begin{bmatrix} -1.6 & -3.2 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ \mu \end{bmatrix} = 0 \quad x_1 = -2\mu$$

$$\lambda_2 = 1: \begin{bmatrix} 6.4 & -3.2 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ \mu \end{bmatrix} = 0 \quad x_1 = \frac{1}{2}\mu$$

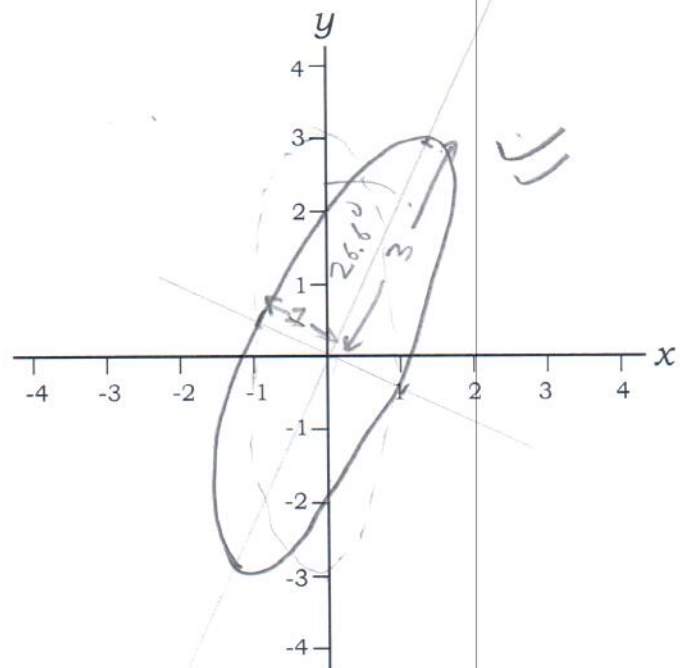
$$\underline{x}_2 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

$$Q = \frac{1}{\sqrt{5}} \begin{bmatrix} +2 & 1 \\ -1 & 2 \end{bmatrix} \quad L = \begin{bmatrix} 9 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\theta = -a \sin\left(\frac{1}{\sqrt{5}}\right) = -26.57^\circ$$

$$a = \sqrt{\frac{9}{9}} = 1$$

$$b = \sqrt{\frac{9}{1}} = 3$$



$\frac{10}{10}$