

## Homework 5

(A) Show that  $3x^2 - 2\sqrt{2}xy + 2y^2 = 1$  is the equation of an ellipse and find its semi-axes using linear algebra.

(B) If  $A$  is negative definite and  $B = C^T A C$  is then  $B$  necessarily negative definite?

(C) Show that if  $A$  is positive definite then so is any integer power of  $A$ .

(D) If  $M$  is a real matrix is  $e^M$  necessarily positive definite?

(E) Without using symbolic software find the eigenvalues and eigenvectors of  $\begin{bmatrix} 6 & -3 \\ -3 & 6 \end{bmatrix} \underline{v} = 2 \begin{bmatrix} 4 & 1 \\ 1 & 4 \end{bmatrix} \underline{v}$

(You can check your calculations using software).