For each of the following matrices
- Find eigenvalues
- Write the matrix as a product of a diagonal matrix and a rotation matrix
- Describe geometrically the linear transformation of the plane defined by the matrix
- Using the geometric description, compute the $10^{th}$ and the $13^{th}$ power of each matrix

(1) \[ A = \begin{pmatrix} \sqrt{3} & -1 \\ 1 & \sqrt{3} \end{pmatrix} \]

(2) \[ A = \begin{pmatrix} \sqrt{3} & 1 \\ -1 & \sqrt{3} \end{pmatrix} \]

(3) \[ A = \begin{pmatrix} -\sqrt{3}/2 & 1 \\ -1 & -\sqrt{3}/2 \end{pmatrix} \]

(4) \[ A = \begin{pmatrix} 2 & 2 \\ -2 & 2 \end{pmatrix} \]

(5) \[ A = \begin{pmatrix} -3 & 0 \\ 0 & -3 \end{pmatrix} \]

(6) \[ A = \begin{pmatrix} a & -b \\ b & a \end{pmatrix} \]. Here, your answer will have $a, b$ and $\arctan$ in it.