Math 274 In-Class **Worksheet 15a**

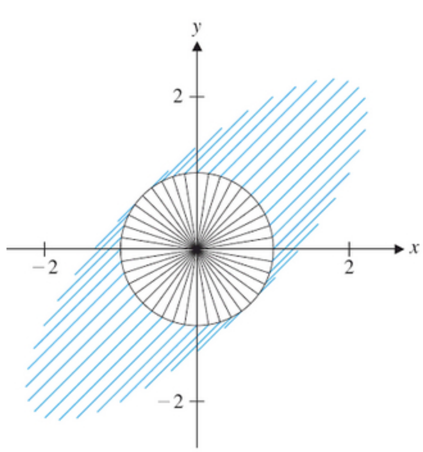
Section: 9.5

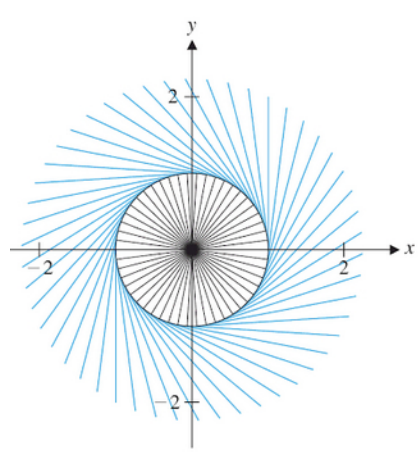
1. (a) Verify that $\mathbf{u}_1 = \begin{bmatrix} 2+\sqrt{5} \\ 1 \end{bmatrix}$ is an eigenvector for $A = \begin{bmatrix} 2 & 1 \\ 1 & -2 \end{bmatrix}$.

   (b) Determine all eigenvectors for the matrix A.

2. Is the Matrix $T = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 6 & 5 \end{bmatrix}$ symmetric?

3. The following describes multiplication by matrices L and R on real 2-vectors. Describe the eigenvalues/vectors for L and R.





4. Solve the ivp:

$$\begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix}' = \begin{bmatrix} 3 & 7 \\ 1 & -3 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \end{bmatrix}, \qquad \begin{bmatrix} x_1(0) \\ x_2(0) \end{bmatrix} = \begin{bmatrix} 5 \\ 3 \end{bmatrix}$$

5. Given that $\mathbf{x}_p(t) = \begin{bmatrix} -t^{-1}/2 \\ t^{-1} \end{bmatrix}$ is a particular solution, describe the general solution to the system $\mathbf{x}'(t) = \mathbf{A}\mathbf{x}(t) + \mathbf{f}(t)$, where $\mathbf{A} = \begin{bmatrix} 8 & -4 \\ 4 & -2 \end{bmatrix}$ and $\mathbf{f}(t) = \begin{bmatrix} t^{-2}/2 \\ t^{-2} \end{bmatrix}$