

**MATH 3110 - Fall 2016**

**Homework 11**

Due: Thursday November 17

QUESTION 1. *Chapter 6.2 and 6.4 of Strang*

*(total of 20 marks)*

1. Give two matrices with eigenvectors  $v_1 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$  and  $v_2 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$ . (4 marks)

2. Compute  $A^{10}$  for  $A = \begin{pmatrix} 3/4 & -1/4 & 1/4 \\ 0 & 1 & 0 \\ 1/4 & 1/4 & 3/4 \end{pmatrix}$ . (5 marks)

3. Compute  $e^A$  for  $A = \begin{pmatrix} -3 & -2 & -1 \\ 6 & 4 & 2 \\ 4 & 2 & 2 \end{pmatrix}$ . (5 marks)

4. (a) Find an orthogonal matrix  $Q$  that diagonalizes  $A = \begin{pmatrix} -2 & 6 \\ 6 & 7 \end{pmatrix}$ . What is  $\Lambda$ ? (6 marks)  
(b) Find all orthogonal matrices that diagonalize  $A = \begin{pmatrix} 9 & 12 \\ 12 & 16 \end{pmatrix}$ .