

**MATH 3110 - Fall 2017**

**Homework 11**

Due: Thursday November 16

QUESTION 1. *Chapter 6.2 and 6.3 of Strang*

*(total of 30 marks)*

1. Give three matrices with eigenvectors  $v_1 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$  and  $v_2 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$ . (6 marks)

2. Compute  $A^{10}$  for  $A = \begin{pmatrix} 3/4 & -1/4 & 1/4 \\ 0 & 1 & 0 \\ 1/4 & 1/4 & 3/4 \end{pmatrix}$ . (8 marks)

3. Consider the following system (8 marks)

$$u_0 = \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix} \quad \text{and} \quad u_{k+1} = \begin{pmatrix} 0 & -2 & 4 \\ 1 & -3 & 2 \\ 0 & 0 & -2 \end{pmatrix} u_k.$$

Compute  $u_{11}$  using the diagonalization method.

4. Compute  $e^A$  for  $A = \begin{pmatrix} -3 & -2 & -1 \\ 6 & 4 & 2 \\ 4 & 2 & 2 \end{pmatrix}$ . (8 marks)