

**MATH 3110 - Fall 2018**

**Homework 5**

Due: October 4, 2018

QUESTION 1. *Chapter 3 of Strang*

*(total of 30 marks)*

1. Compute the rank and give a basis of the four fundamental subspaces of the matrices

(18 marks)

a)  $A = \begin{pmatrix} 1 & 0 & 0 & 1 & 1 \\ 1 & -1 & -1 & 1 & 2 \\ 1 & 2 & 1 & 1 & 0 \end{pmatrix},$

b)  $B = \begin{pmatrix} 1 & 1 & 1 \\ 0 & -2 & 0 \\ -1 & -1 & -1 \\ 2 & -1 & 2 \\ 1 & 3 & 1 \end{pmatrix}.$

2. Find the complete set of solutions of the systems

(12 marks)

a)  $A \begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{pmatrix} = \begin{pmatrix} -1 \\ -2 \\ -3 \end{pmatrix},$

b)  $B \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 3 \\ 2 \\ -3 \\ 9 \\ 1 \end{pmatrix}.$