MA212: Assignment 1

Required Reading.

- Read § 8.1-8.4.

Any problems marked with * require the use of maple. All other problems are to be done by hand. Any problems marked with # can be submitted for review by the grader.

1. Textbook § 8.1, #'s 20#, 21, 29, 30, 39#, 40#, 47, 48#
2. Textbook § 8.2 #'s 1, 6, 9, 16#, 26#, 45*
3. Textbook § 8.3 #'s 7, 8#, 16, 17, 20*.
4. Communication networks can be studied using matrices. Suppose that person 1 can send a message to person 2 or person 3. Person 2 can send a message to person 3. Person 3 can send a message to person 1. We will use the following matrix to denote this.

$$A = \begin{pmatrix} 0 & 1 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$$

   Note that $A_{ij} = 1$ if person i can send a message to person j and is zero otherwise. For example, $A_{1,2} = 1$ because person 1 can send a message to person 2. Compute A^2 and A^3. In terms of communication, what is the meaning of matrices A^2 and A^3?

5. # There are three types of jars containing coins. Jar type 1 has 1 dime, 2 pennies, and 3 quarters. Jar type 2 has 2 dimes, 1 penny, and 1 quarter. Jar type 3 has 1 dime, 3 pennies, and 1 quarter. You can choose as many of each type of jar as you want. Solve a matrix problem to figure out how to choose jars so that you will end up with an equal amount of each type of coin. How many solutions are there (if there are any)?