M561 Problem Set Number 5

1. Problem 10.2

2. Problem 10.3

3. Determine the exact number of flops required for algorithm 10.3 as well as the asymptotic number of flops.

4. Suggest a method using Householder reflectors to bidiagonalize a matrix. Hint: your algorithm should follow the pattern below. Also, using the flop count for the Householder QR, estimate the number of flops required for you bidiagonization algorithm.

$$\begin{pmatrix} x & x & x & x \\ x & x & x & x \\ x & x & x & x \\ x & x & x & x \\ x & x & x & x \\ x & x & x & x \end{pmatrix} \rightarrow \begin{pmatrix} x & x & x & x \\ 0 & x & x & x \\ 0 & x & x & x \\ 0 & x & x & x \\ 0 & x & x & x \\ 0 & x & x & x \end{pmatrix} \rightarrow \begin{pmatrix} x & x & 0 & 0 \\ 0 & x & x & x \\ 0 & x & x & x \\ 0 & x & x & x \\ 0 & x & x & x \\ 0 & x & x & x \end{pmatrix}$$

   The end result should be

$$\begin{pmatrix} x & x & 0 & 0 \\ 0 & x & x & 0 \\ 0 & 0 & x & x \\ 0 & 0 & 0 & x \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$