MACM 316 Assignment 3 Date: October 9, 2006 Date due: 5pm, Friday, October 20, 2006

Please submit your answers, stapled together with your name and student id cover-page, in the assignment box marked MACM 316.

- 1. Problems from the text:
 - (a) Section 6.4: 8, 10
 - (b) Section 6.5: 10(a) (use big-O notation), 10(b)
 - (c) Section 6.6: 6(b)(d), 16, 20, 22, 32
 - (d) Section 7.1: 8, 10
- 2. Consider a super bidiagonal linear system Ax = b of the form shown below. Write in pseudocode *Procedure* **Bidiagonal** $(n, (a_i), (d_i), (b_i))$ to solve the general system of order n (odd). Store the solution in array b.

$$A = \begin{bmatrix} d_1 & & & & & \\ a_1 & d_2 & & & & \\ & a_2 & d_3 & & & \\ & & a_3 & d_4 & a_4 & & \\ & & & & d_5 & a_5 & \\ & & & & & d_6 & a_6 \\ & & & & & & d_7 \end{bmatrix}, x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \\ x_7 \end{bmatrix}, b = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \end{bmatrix}$$

3. Consider a tridiagonal system shown below. Write in pseudocode *Procedure* **Tridiagonal** $(n, (a_i), (d_i), (c_i), (b_i))$ to solve the general system of order n using Gaussian algorithm without pivoting. What is the running time of the algorithm?

$$A = \begin{bmatrix} d_1 & c_1 & & & \\ a_1 & d_2 & c_2 & & \\ & a_2 & d_3 & c_3 & & \\ & & a_3 & d_4 & c_4 & & \\ & & & a_4 & d_5 & c_5 & \\ & & & & a_5 & d_6 & c_6 \\ & & & & & & a_6 & d_7 \end{bmatrix}, x = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \\ x_7 \end{bmatrix}, b = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \\ b_5 \\ b_6 \\ b_7 \end{bmatrix}$$