Follow format of HW as given at
http://www.eng.usf.edu/~kaw/class/programming/homework/sample_homework.htm
for Sample HW for assignments after Test#1

Affidavit Sheet
Pseudo-code (skip the pseudo-code for this assignment)
Flow Chart (skip the flow chart for this assignment)
Mfile for the function
Published Mfile to test the function

Title: Finding whether a matrix is tridiagonal.

Background: A matrix is considered square if its number of rows is same as the number of columns.

$$[A]=\begin{bmatrix}15 & 6 & 7\\ 2 & -4 & 2\\ 3 & 2 & 6\end{bmatrix}$$

is an example of a 3×3 square matrix as it has same number of rows and columns, that is, three.

If a_{ij} is the i^{th} row and the j^{th} column element of a $n\times n$ square matrix [A], then [A] is called a tridiagonal matrix if $a_{ij}= 0,$ whenever $i+1 < j$ or whenever $j+1 < i,$ for all possible values of i and $j,$ $i=1...n,$ $j=1...n$. A general $n\times n$ tridiagonal matrix looks like

$$\mathbf{A}=\begin{pmatrix} a_{1,1} & a_{1,2} & 0 & 0 & \cdots & \cdots & \cdots & 0 & 0 & 0 & 0\\ a_{2,1} & a_{2,2} & a_{2,3} & 0 & \cdots & \cdots & \cdots & 0 & 0 & 0 & 0\\ 0 & a_{3,4} & a_{3,4} & a_{3,4} & \cdots & \cdots & \cdots & 0 & 0 & 0 & 0\\ \vdots & \vdots & \vdots & \ddots & \ddots & \ddots & \vdots & \iddots & \vdots & \vdots & 0\\ 0 & 0 & 0 & \cdots & a_{i,i-1} & a_{i,i} & a_{i,i+1} & \cdots & 0 & 0 & 0\\ \vdots & \vdots & \vdots & \iddots & \vdots & \ddots & \ddots & \ddots & \vdots & \vdots & \vdots\\ 0 & 0 & 0 & 0 & \cdots & \cdots & \cdots & a_{n-2,n-3} & a_{n-2,n-2} & a_{n-2,n-1} & 0\\ 0 & 0 & 0 & 0 & \cdots & \cdots & \cdots & 0 & a_{n-1,n-2} & a_{n-1,n-1} & a_{n-1,n}\\ 0 & 0 & 0 & 0 & \cdots & \cdots & \cdots & 0 & 0 & a_{n,n-1} & a_{n,n}\end{pmatrix}$$

An example of a 5×5 tridiagonal matrix is

$$\begin{bmatrix}2 & 1 & 0 & 0 & 0\\ 3 & 3 & 12 & 0 & 0\\ 0 & 4 & -33 & 21 & 0\\ 0 & 0 & 12 & 0 & 23\\ 0 & 0 & 0 & 14 & 67\end{bmatrix}$$

Specifications:

1. You are going to write your own MATLAB function called *tridiag_checker* with the form

function [flag]=tridiag_checker(A)

for finding whether the square matrix is tridiagonal. Your program should work with square matrix of any size. The input parameter is *A* = square matrix of order

$n \times n$. You need to use loop(s) and conditional statement(s) in the procedure to find if a given square matrix is tridiagonal. Return one variable – *flag;* the value of a variable called *flag* as 0 if [A] is tridiagonal, and is 1 if [A] is not tridiagonal. This Mfile needs to be saved as *tridiag_checker.m*

Then you will write another MFile called *test_tridiagonal.m* that uses the MATLAB function *tridiag_checker* to check if a matrix is tridiagonal or not.

2. Test (do not use input command, just assign the inputs) the program with the following two matrices and two other matrices of your choice of various sizes (greater than 4x4)

$$\begin{bmatrix} 2 & 1 & 0 & 0 & 0 \\ 3 & 3 & 12 & 0 & 0 \\ 0 & 4 & -33 & 21 & 0 \\ 0 & 0 & 12 & 0 & 23 \\ 0 & 0 & 0 & 14 & 67 \end{bmatrix}$$

$$\begin{bmatrix} 2 & 1 & 0 & 0 & 0 \\ 3 & 3 & 12 & 0 & 0 \\ 0 & 4 & -33 & 21 & 0 \\ 0 & 0 & 12 & 0 & 23 \\ 5 & 0 & 0 & 14 & 67 \end{bmatrix}$$