```
% Thomas algorithm
% Midterm Problem 1(a)

clear
clc
close all

load('iterative_testproblem.mat')

[xTA,iterations] = tridiag(Ait,bit);

disp('Solution with Thomas algorithm:  ')
disp(xTA);

xMAT = Ait\bit;
disp('Matlab built-in solution:  ')
disp(xMAT);

ERR = xMAT - xTA;
disp('Error: ')
disp(ERR)

disp('Number of multiplications required for Thomas algorithm:  ')
disp(iterations);

table(xTA, xMAT, ERR)
```

```
Solution with Thomas algorithm:
    0.0329
    0.1316
    0.2400
    0.3375
    0.4142
    0.4642
    0.4839
    0.4720
    0.4293
    0.3584
    0.2641
    0.1526
    0.0310
   -0.0926
   -0.2101
   -0.3138
   -0.3971
   -0.4544
   -0.4819
   -0.4780
   -0.4427
   -0.3785
   -0.2896
   -0.1817
   -0.0619
    0.0619
    0.1817
    0.2896
    0.3785
```

```
     0.4427
     0.4780
     0.4819
     0.4544
     0.3971
     0.3138
     0.2101
     0.0926
    -0.0310
    -0.1526
    -0.2641
    -0.3584
    -0.4293
    -0.4720
    -0.4839
    -0.4642
    -0.4142
    -0.3375
    -0.2400
    -0.1316
    -0.0329

Matlab built-in solution:
     0.0329
     0.1316
     0.2400
     0.3375
     0.4142
     0.4642
     0.4839
     0.4720
     0.4293
     0.3584
     0.2641
     0.1526
     0.0310
    -0.0926
    -0.2101
    -0.3138
    -0.3971
    -0.4544
    -0.4819
    -0.4780
    -0.4427
    -0.3785
    -0.2896
    -0.1817
    -0.0619
     0.0619
     0.1817
     0.2896
     0.3785
     0.4427
     0.4780
     0.4819
     0.4544
     0.3971
     0.3138
     0.2101
     0.0926
    -0.0310
```

```
   -0.1526
   -0.2641
   -0.3584
   -0.4293
   -0.4720
   -0.4839
   -0.4642
   -0.4142
   -0.3375
   -0.2400
   -0.1316
   -0.0329

Error:
   1.0e-15 *

   -0.0069
   -0.0278
   -0.0278
   -0.0555
         0
   -0.0555
   -0.0555
    0.0555
         0
   -0.0555
    0.0555
   -0.0278
   -0.0035
    0.0139
    0.0555
         0
    0.0555
    0.1110
    0.0555
    0.0555
    0.0555
    0.0555
         0
         0
    0.0278
   -0.0139
   -0.0555
   -0.1110
   -0.1110
   -0.1110
   -0.1110
   -0.1110
   -0.1110
         0
         0
         0
         0
    0.0035
         0
    0.0555
    0.0555
    0.0555
    0.0555
    0.0555
    0.0555
```

```
    0.0555
    0.0555
    0.0278
         0
    0.0069

Number of multiplications required for Thomas algorithm:
   246


ans =

  50×3 table

       xTA          xMAT           ERR
    __________    _________    ___________

     0.032907     0.032907    -6.9389e-18
      0.13163      0.13163    -2.7756e-17
      0.23995      0.23995    -2.7756e-17
      0.33746      0.33746    -5.5511e-17
       0.4142       0.4142             0
       0.4642       0.4642    -5.5511e-17
      0.48393      0.48393    -5.5511e-17
      0.47203      0.47203     5.5511e-17
      0.42926      0.42926             0
      0.35842      0.35842    -5.5511e-17
      0.26413      0.26413     5.5511e-17
      0.15256      0.15256    -2.7756e-17
     0.031021     0.031021    -3.4694e-18
    -0.092552    -0.092552     1.3878e-17
     -0.21007     -0.21007     5.5511e-17
     -0.31385     -0.31385             0
      -0.3971      -0.3971     5.5511e-17
     -0.45437     -0.45437     1.1102e-16
     -0.48193     -0.48193     5.5511e-17
     -0.47796     -0.47796     5.5511e-17
     -0.44273     -0.44273     5.5511e-17
     -0.37854     -0.37854     5.5511e-17
     -0.28958     -0.28958             0
     -0.18169     -0.18169             0
    -0.061914    -0.061914     2.7756e-17
     0.061914     0.061914    -1.3878e-17
      0.18169      0.18169    -5.5511e-17
      0.28958      0.28958    -1.1102e-16
      0.37854      0.37854    -1.1102e-16
      0.44273      0.44273    -1.1102e-16
      0.47796      0.47796    -1.1102e-16
      0.48193      0.48193    -1.1102e-16
      0.45437      0.45437    -1.1102e-16
       0.3971       0.3971             0
      0.31385      0.31385             0
      0.21007      0.21007             0
     0.092552     0.092552             0
    -0.031021    -0.031021     3.4694e-18
     -0.15256     -0.15256             0
     -0.26413     -0.26413     5.5511e-17
     -0.35842     -0.35842     5.5511e-17
     -0.42926     -0.42926     5.5511e-17
     -0.47203     -0.47203     5.5511e-17
     -0.48393     -0.48393     5.5511e-17
```

```
    -0.4642      -0.4642     5.5511e-17
    -0.4142      -0.4142     5.5511e-17
   -0.33746     -0.33746     5.5511e-17
   -0.23995     -0.23995     2.7756e-17
   -0.13163     -0.13163              0
  -0.032907    -0.032907     6.9389e-18
```

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