**Computer Exercise 2.3.5**

The following program will use *Tri* to solve the following system where $n = 100$

$4x_1 - x_2 = -20$

$x_{j-1} - 4x_j + x_{j+1} = 40 \quad (2 \le j \le n-1)$

$-x_{n-1} + 4x_n = -20$

```
%seed for random number generator
format default
rng('default')
s = rng;

n = 100;
a = ones(n, 1);
d = -4*ones(n, 1);
c = ones(n, 1);
b = 40*ones(n, 1);
[a(n-1), d(1), d(n), c(1), b(1), b(n)] = deal(-1, 4, 4, -1, -20, -20);
b = tri(n, a, d, c, b);
b1 = b(1:20);
b2 = b(21:40);
b3 = b(41:60);
b4 = b(61:80);
b5 = b(81:100);
T = table(b1, b2, b3, b4, b5, 'VariableNames', ...
    {'b1 to b20', 'b21 to b40', 'b41 to b60', 'b61 to b80', 'b81 to b100'});
disp(T)
```

| b1 to b20 | b21 to b40 | b41 to b60 | b61 to b80 | b81 to b100 |
|---|---|---|---|---|
| -9.282 | -20 | -20 | -20 | -20 |
| -17.128 | -20 | -20 | -20 | -20 |
| -19.23 | -20 | -20 | -20 | -20 |
| -19.794 | -20 | -20 | -20 | -20 |
| -19.945 | -20 | -20 | -20 | -20 |
| -19.985 | -20 | -20 | -20 | -20 |
| -19.996 | -20 | -20 | -20 | -20 |
| -19.999 | -20 | -20 | -20 | -20 |
| -20 | -20 | -20 | -20 | -20 |
| -20 | -20 | -20 | -20 | -20 |
| -20 | -20 | -20 | -20 | -20 |
| -20 | -20 | -20 | -20 | -20 |
| -20 | -20 | -20 | -20 | -19.999 |
| -20 | -20 | -20 | -20 | -19.996 |
| -20 | -20 | -20 | -20 | -19.985 |
| -20 | -20 | -20 | -20 | -19.945 |
| -20 | -20 | -20 | -20 | -19.794 |
| -20 | -20 | -20 | -20 | -19.23 |
| -20 | -20 | -20 | -20 | -17.128 |
| -20 | -20 | -20 | -20 | -9.282 |

It appears the result is symmetric in its entries.

```
function b = tri(n, a, d, c, b)
   for i = 2:n
       xmult = a(i-1)/d(i-1);
       d(i) = d(i) - (xmult*c(i-1));
       b(i) = b(i) - (xmult*b(i-1));
   end
   b(n) = b(n)/d(n);
   for i = (n-1):-1:1
       b(i) = (b(i) - c(i)*b(i+1))/d(i);
   end
end
```