NAME: **Patrick Dillon Ryan**

STUDENT NUMBER: **17340382**

Please indicate your answers by entering the option ((i), (ii), (iii) or (iv)) where asked. You should append the completed document as a pdf with your typewritten worked solutions including MATLAB code) and upload to Blackboard.

Q 4.23

(i)

L =

1.5000	0	0	0
-2.0000	1.0000	0	0
0.5000	1.0000	1.5000	0
-2.0000	3.5000	-0.5000	1.0000

U =

4.0000	-1.0000	3.0000	2.0000
0	-1.0000	3.0000	0.5000
0	0	2.0000	1.0000
0	0	0	3.0000

(ii)

L =

1.0000	0	0	0
-2.0000	1.0000	0	0
0.5000	1.5000	1.0000	0
-2.0000	3.0000	-0.5000	1.0000

U =

4.0000	-1.0000	3.0000	2.0000
0	-2.0000	3.0000	0.5000
0	0	4.0000	2.0000
0	0	0	3.0000

(iii)

L =

1.5000	0	0	0
-2.0000	1.0000	0	0
0.5000	1.0000	1.0000	0
-2.0000	2.0000	-0.5000	1.0000

U =

3.0000	-1.5000	3.0000	2.0000
0	-2.0000	3.0000	0.5000
0	0	4.0000	2.5000
0	0	0	1.0000

(iv)

L =

1.5000	0	0	0
-2.0000	1.5000	0	0
0.5000	1.5000	1.5000	0
-2.0000	3.0000	-0.5000	1.5000

U =

4.0000	-1.0000	3.0000	2.0000
0	-2.0000	3.0000	0.5000
0	0	4.0000	2.0000
0	0	0	2.0000

Your Answer ((i) – (iv)): __(ii)___

Matlab Code

```
Matrice = [4, -1, 3, 2; -8, 0 ,-3, -3.5; 2, -3.5, 10, 3.75; -8, -4, 1, -
0.5];

Matrx = LowerMatrice*UpperMatrice;

    [m,n] = size(Matrx);
    if (m~=n)
        disp("Matrix is not square");
    end
    UpperMatrice = Matrx;          % make a copy for upperMatrice
    LowerMatrice = eye(n); %Create an identity matrix for LowerMatrice
    for i = 1:n-1       % to go through each row except the last one
        for j = i+1:n   % continue for rest of rows
            LowerMatrice(j,i) = UpperMatrice(j,i)/UpperMatrice(i,i);
            for k = 1:n
                temp = (LowerMatrice(j,i) * UpperMatrice(i,k));
```

```
                UpperMatrice(j,k) = UpperMatrice(j,k) - temp;    % from
UpperMatrice(j,k) -> UpperMatrice(i,j) becomes 0
            end
        end
    end

    disp(LowerMatrice);
    disp(UpperMatrice);
```

>> assignment2Part1

```
   1.0000         0         0         0
  -2.0000    1.0000         0         0
   0.5000    1.5000    1.0000         0
  -2.0000    3.0000   -0.5000    1.0000

   4.0000   -1.0000    3.0000    2.0000
        0   -2.0000    3.0000    0.5000
        0         0    4.0000    2.0000
        0         0         0    3.0000
```

Q 5.17

You need only to indicate the best team and the worst team (from teams 1 to 6).

Your Answers: **Best __2 & 5____** **Worst___1___**

Matlab Code

```
Matrice = [0,0,0,1,0,0; 1,0,1,0,1,1; 0,1,0,0,1,0; 1,1,0,0,1,0; 1,1,1,0,0,1;
1,0,0,0,1,0];

[V, D] = eig(Matrice);
disp(V);
disp(D);
```

>> assignment2Part2

```
  0.1761 + 0.0000i   0.3379 + 0.0000i   0.0000 + 0.0000i  -0.5773 - 0.0000i  -0.5773 + 0.0000i
0.5774 + 0.0000i
  0.5155 + 0.0000i  -0.1443 + 0.0000i   0.0000 + 0.0000i  -0.0000 + 0.0000i  -0.0000 - 0.0000i
-0.0000 + 0.0000i
  0.3938 + 0.0000i  -0.7555 + 0.0000i  -0.7071 + 0.0000i   0.0000 - 0.0000i   0.0000 + 0.0000i
0.0000 + 0.0000i
```

0.4611 + 0.0000i 0.1290 + 0.0000i 0.0000 + 0.0000i 0.5774 + 0.0000i 0.5774 + 0.0000i -0.5773 + 0.0000i
0.5155 + 0.0000i -0.1443 + 0.0000i -0.0000 + 0.0000i -0.0000 + 0.0000i -0.0000 - 0.0000i -0.0000 + 0.0000i
0.2642 + 0.0000i 0.5068 + 0.0000i 0.7071 + 0.0000i 0.5773 + 0.0000i 0.5773 - 0.0000i -0.5774 + 0.0000i

2.6180 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.3820 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i -1.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i -1.0000 - 0.0000i 0.0000 + 0.0000i
0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i 0.0000 + 0.0000i -1.0000 + 0.0000i

Q 6.3

$$Y = mx + \ln(b)$$
$$Y = \ln(y)$$
$$y = be^{mx}$$
$$m = .012$$
$$\ln(b) = 4.6931 \times 10^{-8}$$
$$4.6931 \times 10^{-8} e^{-.012 * x}$$
$$4.6931 \times 10^{-8} e^{-.012 * 1985} = 1038$$

(i) $b = 4.6831 \times 10^{-8}, \quad m = 0.022, \quad population(1985) = 1014\ million$
(ii) $b = 4.8932 \times 10^{-8}, \quad m = 0.022, \quad population(1985) = 1024\ million$
(iii) $b = 4.6931 \times 10^{-8}, \quad m = 0.012, \quad population(1985) = 1038\ million$
(iv) $b = 4.9932 \times 10^{-8}, \quad m = 0.014, \quad population(1985) = 1042\ million$

Your Answer ((i)-(iv)): ____(iii)____