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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) __

```
function [L,U] = MathsQ4_23(A)
%A = [4 -1 3 2; -8 0 -3 -3.5; 2 -3.5 10 3.75; -8 -4 1 -0.5];
[row, col] = size(A);
if row ~= col
    disp('Matrix must be square');
else
    L = eye(row);
    U = A;
    for i1 = 1:row-1
        for i2 = i1+1:row
            L(i2,i1) = U(i2,i1)/U(i1,i1);
            for i3 = 1:row
                U(i2,i3) = U(i2,i3) - (L(i2,i1) * U(i1,i3));
            end
        end
    end
end
disp(L);
disp(U);
```

```

if L*U == A
    disp('Well done');
else
    disp('Wrong answer');
end
end

```

Q 5.17

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

Your Answers: **Best _2 and 5_** **Worst __1__**

```

A = [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];

```

```

[Vec,Val] = eig(A);
disp(Vec);
disp(Val);

```

```

>> MathsQ5_17
0.1761 + 0.0000i    0.3379 + 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
0.3938 + 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    0.5773 - 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
0.2642 + 0.0000i    0.5068 + 0.0000i    0.7071 + 0.0000i    0.5774 + 0.0000i    0.5774 - 0.0000i   -0.5773 + 0.0000i

```

Eigenvectors that are both real and of same sign.

Eigenvalues: 2.618+0i, 0.382+0i, 0+0i, -1+0i, -1-0i, -1+0i

Q 6.3

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

Your Answer ((i)-(iv)): __(iv)__

$$p = be^{mx}$$

$$(\ln)p = mx + (\ln)b$$

x	(ln)y	x^2	x(ln)y	Σx	Σ(ln)y	Σx^2	Σx(ln)y
1900	5.991465	3610000	11383.78	13800	47.31856	27214000	93384.49
1950	6.322565	3802500	12329				
1970	6.715383	3880900	13229.3				
1980	6.888572	3920400	13639.37				
1990	7.034387	3960100	13998.43				
2000	7.143618	4000000	14287.24				
2010	7.222566	4040100	14517.36				

$$m = \frac{N\Sigma(xy) - \Sigma x \Sigma y}{N\Sigma(x^2) - (\Sigma x)^2}$$

$$m = \frac{(7 * 93384.49) - (13800 * 47.31856)}{(7 * 27214000) - (13800)^2} = 0.012$$

$$b = \frac{\Sigma y - m \Sigma x}{N}$$

$$b = \frac{47.31856 - (0.012 * 13800)}{7} = 4.9932 * 10^{-8}$$

$$7.593374193 = 0.012x + 4.9932 * 10^{-8} = 1042$$