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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)**

Matlab Program:

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

[L,U] = LUdecompGauss(M);
A = L*U;
```

```
if L ~= 0
    disp(A);
    disp(L);
    disp(U);
end



function [L, U] = LUdecompGauss(A)


    [m,n] = size(A);
    if m ~= n
        L=0;
        U=0;
        disp('Square Matrices Only');
        return
    end

    L = eye(m,n);
    U = A;

    for i = 1:n-1

        for j = i+1:n
            L(j,i) = U(j,i)/U(i,i);

            for k = 1:n
                U(j,k) = U(j,k) - (L(j,i)*U(i,k));
            end

        end

    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 & 5 Worst 1

```
M = [
      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
   ];

[X, Y] = eig(M);
disp(X);
disp(Y);
```

Q 6.3

(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)

$p = be^{mx} \equiv \ln(p) = mx + \ln(b)$

So in the equation $y = a_1x + a_0$

y = ln(p)
a_1 = m
x = x
a_0 = ln(b)

x	1900	1950	1970	1980	1990	2000	2010
p	400	557	825	981	1135	1266	1370

$S_x = \sum_{i=1}^{n}(x_i)$ = 13800

$S_y = \sum_{i=1}^{n}(y_i)$ = 47.31855718

$S_{xy} = \sum_{i=1}^{n}(x_i)\,(y_i)$ = 93384.48848

$S_{xx} = \sum_{i=1}^{n}(x_i)^2$ = 27214000

$a_1 = \frac{n(S_{xy})-(S_x)(S_y)}{n(S_{xx})-(S_x)^2}$ = 0.01198845303 = m

$a_0 = \frac{(S_{xx})(S_y)-(S_{xy})(S_x)}{n(S_{xx})-(S_x)^2}$ = -16.87458496 = ln(b)

b = $e^{-16.87458496}$ = $4.693111463 \times 10^{-8}$

ln(p) = mx + ln(b)
p = $e^{mx + ln(b)}$
p = 1038.375344 million