**Question 2:**

1. For a matrix to be symmetric, A=AT

* Since A=AT, the matrix is said to be symmetric

1. For a matrix to be positively defined, all the leading principal minors should be greater than zero

Det of A1=1 >0

Det of A2=20>0

Det of A3=4>0

Det of A4=20>0

* Since all the leading principal minors should be greater than zero, the matrix A is said to be positively defined

**Question 4:**

Let X1=X, X2=Y, X3=Z

The equation becomes

12X+7Y+3Z=2

X+5Y+Z=-5

2X+7Y-11Z=6

Making X, Y and Z subject of the formula in equation 1, 2 and 3 respectively

X=1/12(2-7y-3z)

Y=1/5(-5-x-z)

Z=1/11(2x+7y-6)

Using [1; 3; 5]T as the initial values and solving for the first 3 iterations on calculator gives

1st Iteration:

X=-17/6 =-2.83

Y= -43/30 =-1.43

Z= -217/110 = -1.97

2nd Iteration:

X= 1481/990 =1.49

Y= -2239/2475 = -0.90

Z= -7706/9075 = -0.85

3rd Iteration:

X=0.91

Y=-1.01

Z=-1.02

**QUESTION 5:**

As seen above;

The LU decomposition of the original matrix becomes;

The above equation can be reduced to

Equation 1

Equation 2

Solving for the values of Y from equation 1

Y1=2

0.33Y1+Y2=3

0.17Y1+0.2Y2+Y3=11

-0.17Y1+0.1Y2-0.24Y3+Y4=20

Solving subequation1,2,3 and 4 simultaneously gives

Y1=2

Y2=2.34

Y3=10.192

Y4=22.55

Substituting the values of Y in equation 2 gives;

Solving for the values of X from equation 2

6X1+2X2+X3+X4=2

3.33X2+0.67X3-0.33X4=2.34

3.7X3-1.1X4=10.192

2.93X4=22.55

Solving subequation1,2,3 and 4 simultaneously gives

X1=-1.98

X2=0.56

X3=5.04

X4=7.7