```
format short g
clc;
clear all;

fprintf("CH5019 - Project\n");
fprintf("Group - 25");
for i = 1:5
    q1(1,i);
end

q2(2,i);

function variant(x,y)
    fprintf("\n\n\n");
    fprintf("<Q. %d, V. %d>
\n-----------------------------------------------\n",x,y);
end

function q1(ques,vari)
    variant(ques,vari);
    c1 =randi([1,6],1,1);
    c2 = randi([3,7],1,1);

    A11 =randi([1,2],1,1);
    A12 =randi([5,7],1,1);
    A21 =randi([5,6],1,1);
    A22 =randi([1,2],1,1);
    A31 =randi([2,2],1,1);
    A32 =randi([2,2],1,1);

    b1 =100*randi([15,17],1,1);
    b2 =100*randi([10,13],1,1);
    b3 =100*randi([9,12],1,1);

    fprintf( "Solve the LPP using graphical method and find the
 Optimal Basic Feasible Solution from the graph.\n")
    fprintf( "Objective Function is defined as Maximise %.2f x1 +%.2f
 x2.\n",c1,c2)
    fprintf( "Constraints are given by %.2f x1 +%.2f x2 <= %.2f ,
 %.2f x1 +%.2f x2 <= %.2f , %.2f x1 +%.2f x2 <= %.2f and x1,x2>=0.
\n",A11,A12,b1,A21,A22,b2,A31,A32,b3)

    % Input parameters
    C= [c1,c2];       %cost
    A= [ A11 A12; A21 A22;A31 A32]; % weights of x1, x2 in each
 constraint
    b = [b1;b2;b3]; % RHS of constraint

    y1 = 0:1: max(b);
    x21 = (b(1)-A(1,1).*y1)./A(1,2);
    x22 = (b(2)-A(2,1).*y1)./A(2,2);
    x23 = (b(3)-A(3,1).*y1)./A(3,2);
```

```
    x21 = max(0,x21);
    x22 = max(0,x22);
    x23 = max(0,x23);

    plot(y1, x21, 'r',y1, x22, 'k',y1, x23, 'b')
    xlabel ('value of x1')
    ylabel ('value of x2')
    title (' x1 vs x2')
    legend ('Line 1' , 'Line 2' , 'Line 3')
    grid on

    % finding corner points on axes
    cx1 = find(y1==0);

    c1 = find (x21==0);
    Line1 = [y1(:,[c1 cx1]) ; x21(:,[c1 cx1])]';

    c2 = find (x22==0);
    Line2 = [y1(:,[c2 cx1]) ; x22(:,[c2 cx1])]';

    c3 = find (x23==0);
    Line3 = [y1(:,[c3 cx1]) ; x23(:,[c3 cx1])]';

    corpt = unique([Line1;Line2;Line3;],'rows');

    % finding corner points
    Corner_Points(3,2) = 0;
    arr= [1,2,3,1];
    for i= 1:3
        A1 = A(arr(i),:);
        b_1 = b(arr(i),:);
        A2 = A(arr(i+1),:);
        b_2 = b(arr(i+1),:);
            Aa = [A1;A2];
            Bb = [b1;b2];
            New_corner_point = Aa\Bb;
        Corner_Points(i,:) = [New_corner_point];
    end
         All_Corner_Points = [Corner_Points; corpt ]

    Feasible_Corner_Points = constraint(All_Corner_Points,
A11,A12,A21,A22,A31,A32,b1,b2,b3);
    Feasible_Corner_Points = unique (Feasible_Corner_Points, 'rows');

    for i=1: size(Feasible_Corner_Points,1)
        z(i,:) = sum(Feasible_Corner_Points(i,:).*C);
    end

    x1_x2_z = [Feasible_Corner_Points z];

    [z_val, z_index] = max(z);
    optimal_BFS_value = x1_x2_z(z_index,:);
```

```
    fprintf("\nOptions\n");
    Id=["A.","B.","C.","D."];

    for i = 1:3
        fprintf("%s %f %f \n",Id(i),All_Corner_Points(i,:));
    end
        fprintf("%s %f %f
 \n",Id(4),Feasible_Corner_Points(z_index,:));
     fprintf("\nExplanation:\n");
     fprintf("The graph is generated from the code written above.\n")
     fprintf("the corner points other than on the axes are calculated
 from the graph. \n")
     Corner_Points
     fprintf("feasibilty of these Corner points are checked. \n")
     fprintf("Optimum value from the feasible corner points including
 the corner points on the axis is calculated.\n")
     x1_x2_z(z_index,:)
        function out = constraint(X, A11,A12,A21,A22,A31,A32,b1,b2,b3)
            x1 = X(:,1);
            x2 = X(:,2);

            cons1 = A11.*x1+ A12.*x2 - b1;   %< sign
            h1 = find (cons1>0);
            X(h1,:)=[] ;

            x1 = X(:,1);
            x2 = X(:,2);

            cons2 = A21.*x1+ A22.*x2 - b2;   %< sign
            h2 = find (cons2>0);
            X(h2,:)=[] ;

            x1 = X(:,1);
            x2 = X(:,2);

            cons3 = A31.*x1+ A32.*x2 - b3;   %< sign
            h3 = find (cons3>0);
            X(h3,:)=[] ;

            out =X;
        end
end

function q2(ques,vari)
    variant(ques,vari);
    fprintf('As part of an experiment to determine the efficiency
 of a vaccine, a test drive is conducted and certain parameters were
 measured during the drive like gender,age and weight\n')
    fprintf('Determine what kind of data they were?\n')
    answer=['nominal interval ratio'];
    dupe1=['ordinal',' interval', ' ordinal'];
    dupe2=['ratio',' interval', ' ordinal'];
    dupe3=['nominal',' ratio', ' ordinal'];
    fprintf('A: %s\n',answer)
```

```
    fprintf('B: %s\n',dupe1)
    fprintf('C: %s\n',dupe2)
    fprintf('D: %s\n',dupe3)
    fprintf("\nAnswer: A\n");
    fprintf('Explanation:\n');
    fprintf('Gender is nominal as it is purely an id label for
 collection.\n')
    fprintf('Age is interval data as the order and intervals within it
 are meaningful and used for data segregation.\n')
    fprintf('Weight is a ratio variable as it has the properties of an
 interval and also zero weight is meaningful and two weight variables
 can be compared by division.\n')



end

CH5019 - Project
Group - 25


<Q. 1, V. 1>
-----------------------------------------------
Solve the LPP using graphical method and find the Optimal Basic
 Feasible Solution from the graph.
Objective Function is defined as Maximise 3.00 x1 +7.00 x2.
Constraints are given by 1.00 x1 +6.00 x2 <= 1700.00 , 5.00 x1 +2.00
 x2 <= 1300.00 , 2.00 x1 +2.00 x2 <= 1200.00 and x1,x2>=0.

All_Corner_Points =

       157.14       257.14
       133.33       516.67
          760           90
            0       283.33
            0          600
            0          650
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Options
A. 157.142857 257.142857
B. 133.333333 516.666667
C. 760.000000 90.000000
D. 0.000000 283.333333

Explanation:
The graph is generated from the code written above.
the corner points other than on the axes are calculated from the graph.

Corner_Points =

157.14	257.14
133.33	516.67
760	90

feasibilty of these Corner points are checked.
Optimum value from the feasible corner points including the corner points on the axis is calculated.

ans =

0	283.33	1983.3

<Q. 1, V. 2>

Solve the LPP using graphical method and find the Optimal Basic Feasible Solution from the graph.

Objective Function is defined as Maximise 4.00 x1 +3.00 x2.
Constraints are given by 1.00 x1 +5.00 x2 <= 1700.00 , 6.00 x1 +1.00 x2 <= 1100.00 , 2.00 x1 +2.00 x2 <= 900.00 and x1,x2>=0.

All_Corner_Points =

131.03	313.79
230	320
787.5	62.5
0	340
0	450
0	1100
184	0
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Options
A. 131.034483 313.793103
B. 230.000000 320.000000
C. 787.500000 62.500000
D. 131.034483 313.793103

Explanation:
The graph is generated from the code written above.
the corner points other than on the axes are calculated from the
 graph.

Corner_Points =

      131.03      313.79
         230         320
       787.5        62.5

feasibilty of these Corner points are checked.
Optimum value from the feasible corner points including the corner
 points on the axis is calculated.

ans =

      131.03      313.79      1465.5



<Q. 1, V. 3>
-----------------------------------------------
Solve the LPP using graphical method and find the Optimal Basic
 Feasible Solution from the graph.
Objective Function is defined as Maximise 2.00 x1 +6.00 x2.
Constraints are given by 1.00 x1 +6.00 x2 <= 1500.00 , 6.00 x1 +2.00
 x2 <= 1300.00 , 2.00 x1 +2.00 x2 <= 1200.00 and x1,x2>=0.
```

```
All_Corner_Points =

       141.18       226.47
           50          600
          640          110
            0          250
            0          600
            0          650
          217            0
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Options

A. 141.176471 226.470588
B. 50.000000 600.000000
C. 640.000000 110.000000
D. 141.176471 226.470588

Explanation:
The graph is generated from the code written above.
the corner points other than on the axes are calculated from the graph.

Corner_Points =

141.18	226.47
50	600
640	110

feasibilty of these Corner points are checked.
Optimum value from the feasible corner points including the corner points on the axis is calculated.

ans =

141.18	226.47	1641.2

<Q. 1, V. 4>

Solve the LPP using graphical method and find the Optimal Basic Feasible Solution from the graph.
Objective Function is defined as Maximise 3.00 x1 +5.00 x2.
Constraints are given by 1.00 x1 +5.00 x2 <= 1600.00 , 6.00 x1 +2.00 x2 <= 1100.00 , 2.00 x1 +2.00 x2 <= 900.00 and x1,x2>=0.

All_Corner_Points =

82.143	303.57
125	425
725	75
0	320
0	450
0	550
184	0
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         1599           0
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Options
A. 82.142857 303.571429
B. 125.000000 425.000000
C. 725.000000 75.000000
D. 82.142857 303.571429

Explanation:
The graph is generated from the code written above.
the corner points other than on the axes are calculated from the
 graph.

Corner_Points =

       82.143       303.57
          125          425
          725           75

feasibilty of these Corner points are checked.
Optimum value from the feasible corner points including the corner
 points on the axis is calculated.

ans =

       82.143       303.57       1764.3



<Q. 1, V. 5>
-----------------------------------------------
Solve the LPP using graphical method and find the Optimal Basic
 Feasible Solution from the graph.
Objective Function is defined as Maximise 3.00 x1 +3.00 x2.
Constraints are given by 2.00 x1 +5.00 x2 <= 1600.00 , 6.00 x1 +1.00
 x2 <= 1200.00 , 2.00 x1 +2.00 x2 <= 1100.00 and x1,x2>=0.

All_Corner_Points =

       157.14       257.14
          200          400
       933.33      -133.33
            0          320
            0          550
            0         1200
          200            0
          201            0
          202            0
          203            0
          204            0
          205            0
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Options
A. 157.142857 257.142857
B. 200.000000 400.000000
C. 933.333333 -133.333333
D. 157.142857 257.142857

Explanation:

```
The graph is generated from the code written above.
the corner points other than on the axes are calculated from the
 graph.

Corner_Points =

       157.14       257.14
          200          400
       933.33      -133.33

feasibilty of these Corner points are checked.
Optimum value from the feasible corner points including the corner
 points on the axis is calculated.

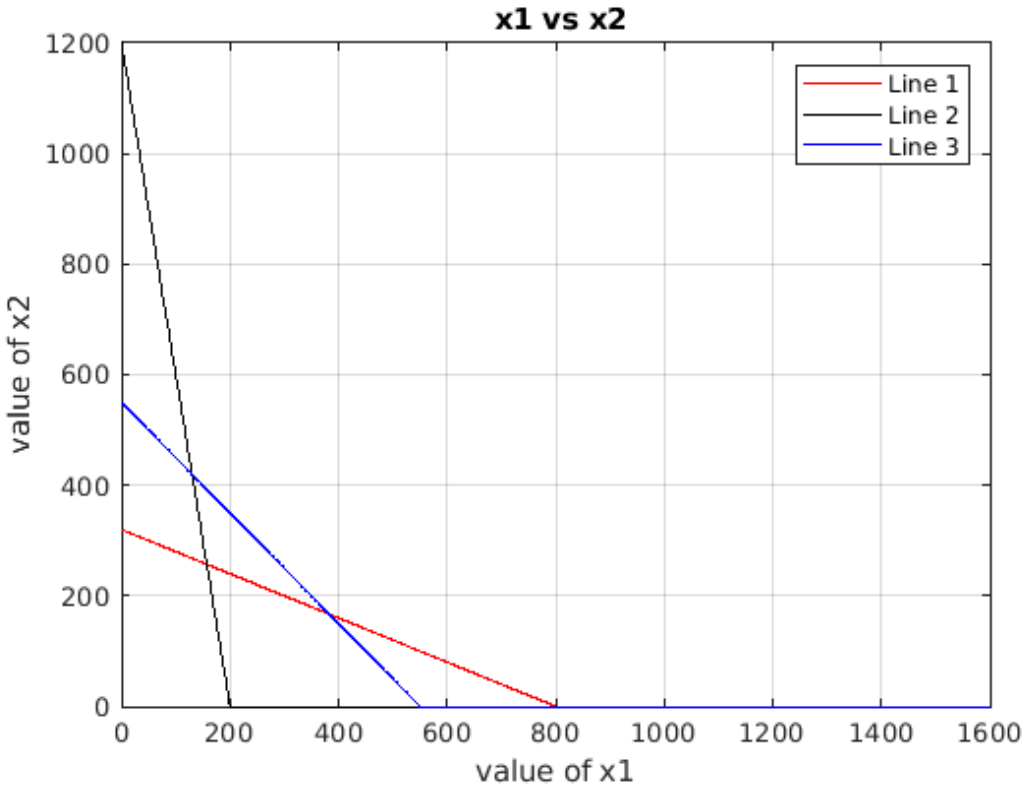
ans =

       157.14       257.14       1242.9



<Q. 2, V. 5>
-----------------------------------------------
As part of an experiment to determine the efficiency of a vaccine, a
 test drive is conducted and certain parameters were measured during
 the drive like gender,age and weight
Determine what kind of data they were?
A: nominal interval ratio
B: ordinal interval ordinal
C: ratio interval ordinal
D: nominal ratio ordinal

Answer: A
Explanation:
Gender is nominal as it is purely an id label for collection.
Age is interval data as the order and intervals within it are
 meaningful and used for data segregation.
Weight is a ratio variable as it has the properties of an interval
 and also zero weight is meaningful and two weight variables can be
 compared by division.
```



Published with MATLAB® R2021a