```
format short q
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");
    fprintf("<Q. %d, V. %d>
                   -----\n",x,y);
end
function q1(ques,vari)
    variant(ques,vari);
    c1 =randi([1,6],1,1);
    c2 = randi([3,7],1,1);
    All = 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 ,</pre>
 %.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
    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);
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```
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 \le 1300.00 , 2.00 x1 + 2.00 x2 \le 1200.00 and x1, x2 \ge 0.
All_Corner_Points =
       157.14
                    257.14
       133.33
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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
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0	450
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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
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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
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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
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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

${\it Explanation:}$

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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

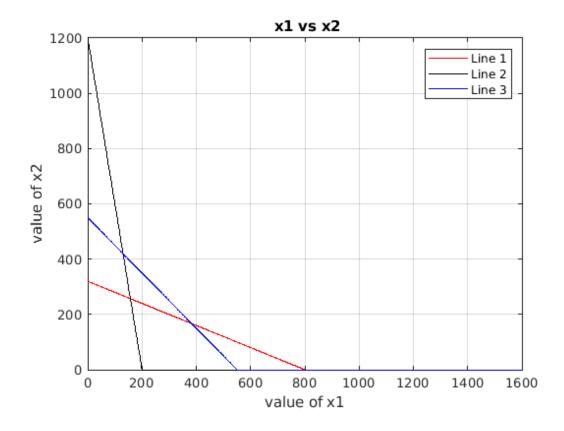
D: nominal ratio ordinal

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.



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