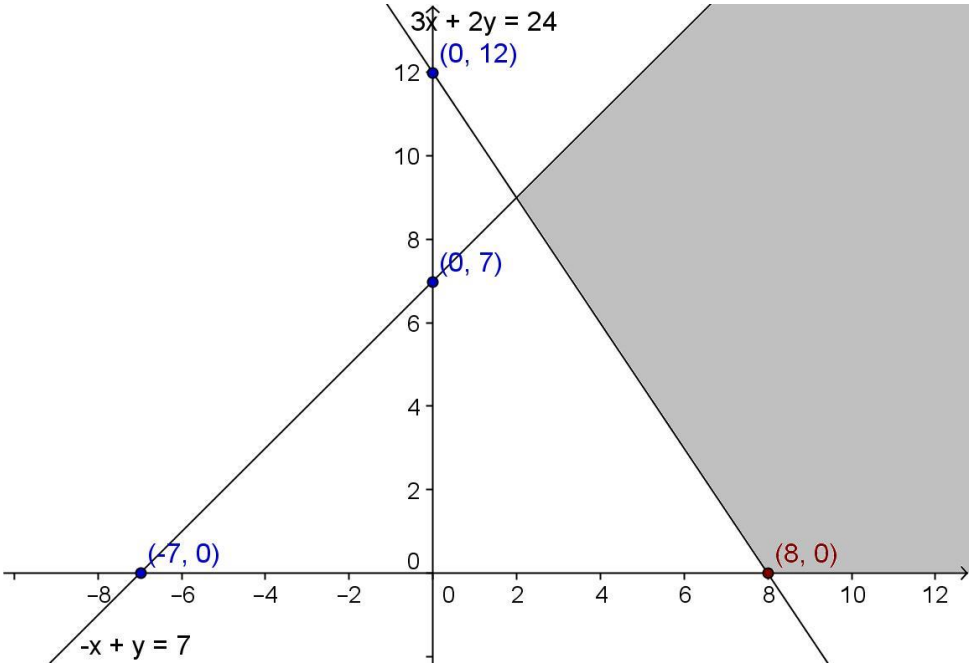
Task:

Solve the following linear programming problem using graphical methods
Minimize z= 2x+8y
Subject to x-y > -7
3x+2y > 24
x > 0
y > 0
Find the minimum z value and name the points

Solution.

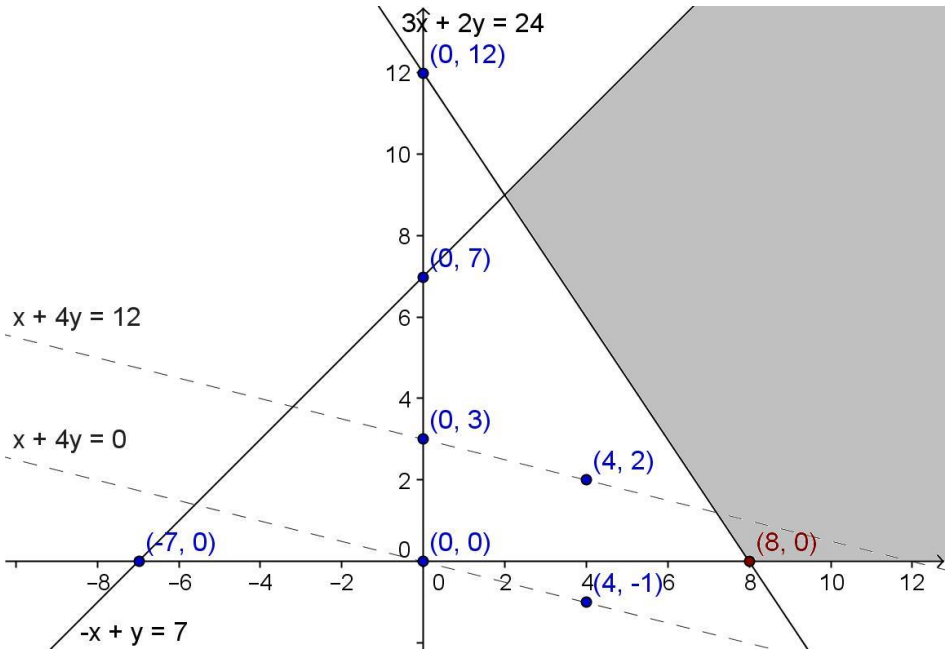
1. Depict straight lines x-y=-7 and 3x+2y=24

x-y=-7 ⇔ y=x+7. Put x=0 and x=-7. x-y=-7 passes through the points (0,7) and (7,0).
3x+2y=24 passes through the points (8,0) and (0,12).
Conditions x-y > -7, 3x+2y > 24, x> 0, y > 0 correspond to part of the plane, highlighted in grey.

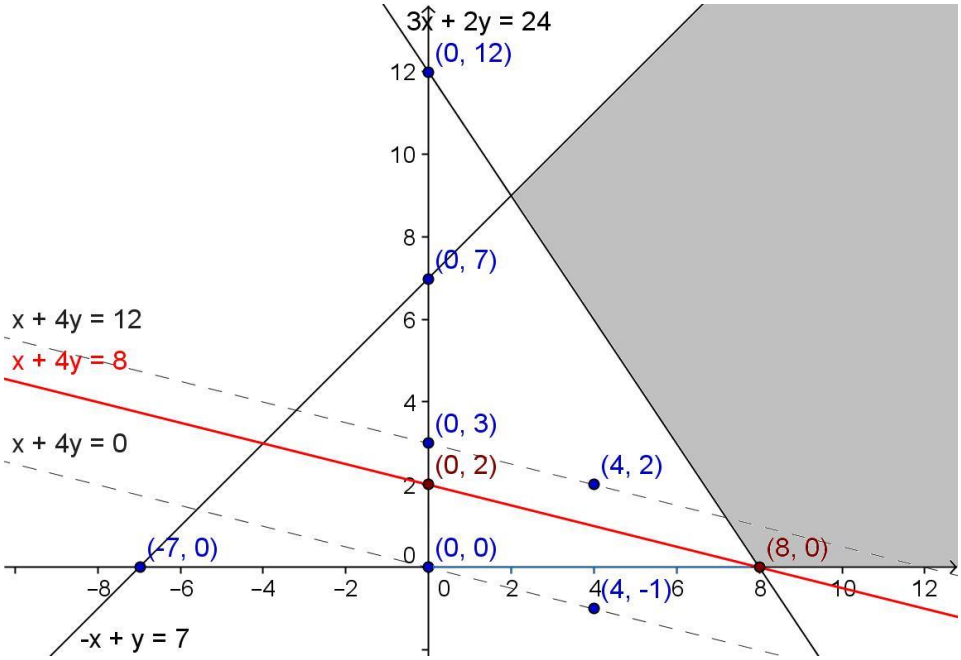


2. z=2x+8y ⇔ 4y=1/2*z-x ⇔ y=1/8*z-1/4*x.
   All lines z=2x+8y will have the same slope and are moved up or down depending on the value of z.

For example, z=0, x+4y=0 or z=24, x+4y=12.



3. As we can see, in order to satisfy the conditions and for minimize z= 2x+8y, this line should cross with the gray part of the plane and pass through the point (8,0).



Our sought-for line is highlighted in red.
Put in equation z=2x+8y x=8 and y=0 we get z=16. Minimum value of z is 16, but it is not achieved, since x>0 and 3x+2y>24. So, z>16.

Answer:

z>16. Minimum value of z is 16, but it is not achieved.