Foundations of Math 11 Optimiztion Worksheet

Short Answer

1. The following model represents an optimization problem. Determine the maximum solution.
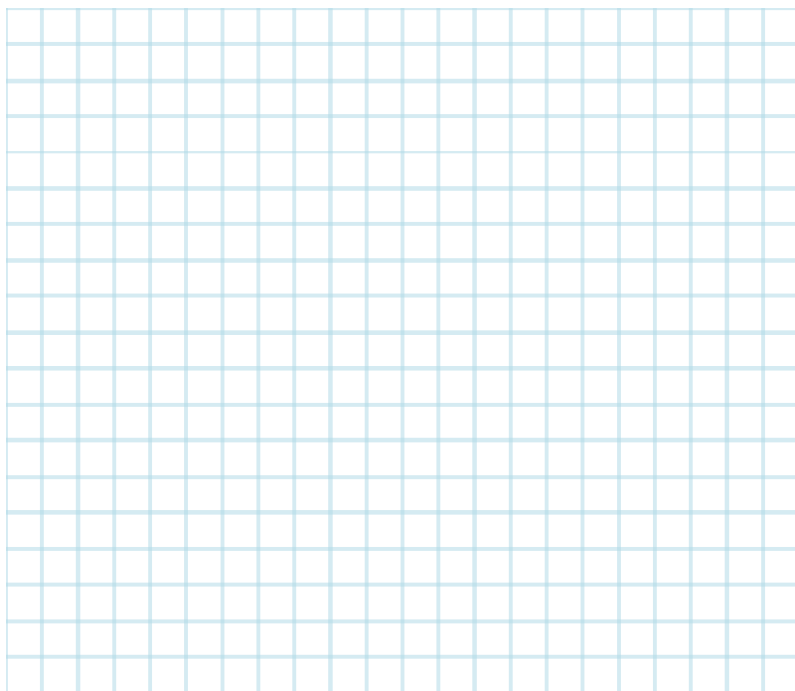
   Constraints:
   $x \geq 0$
   $y \geq 0$
   $x + y \leq 25$

   Objective function:
   $A = x + 2y$

2. The following model represents an optimization problem. Determine the maximum solution.

Constraints:
$x \geq 0$
$y \geq 0$
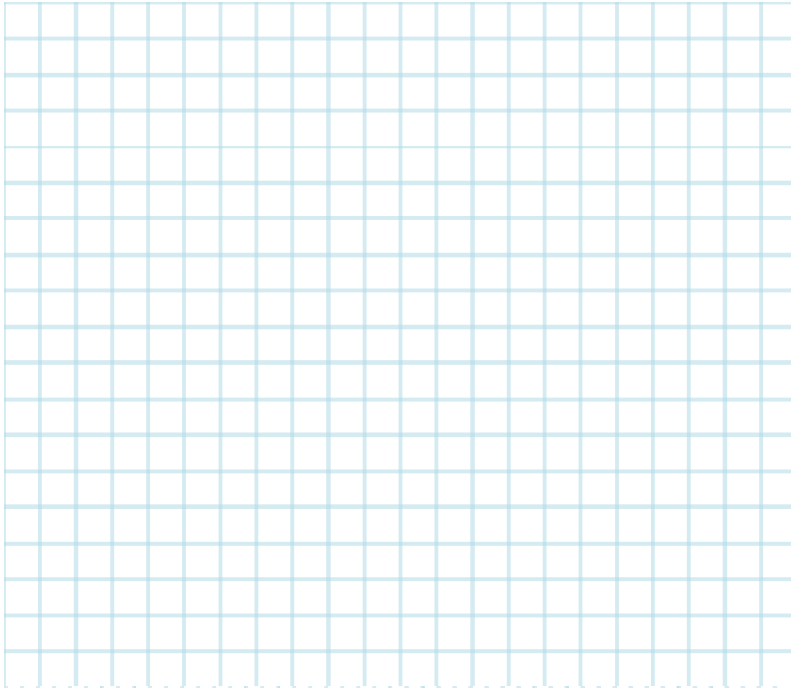$2x + y \geq 10$
$x + y \leq 20$

Objective function:
$Q = 2y - 10x$

3. The following model represents an optimization problem. Determine the minimum solution.
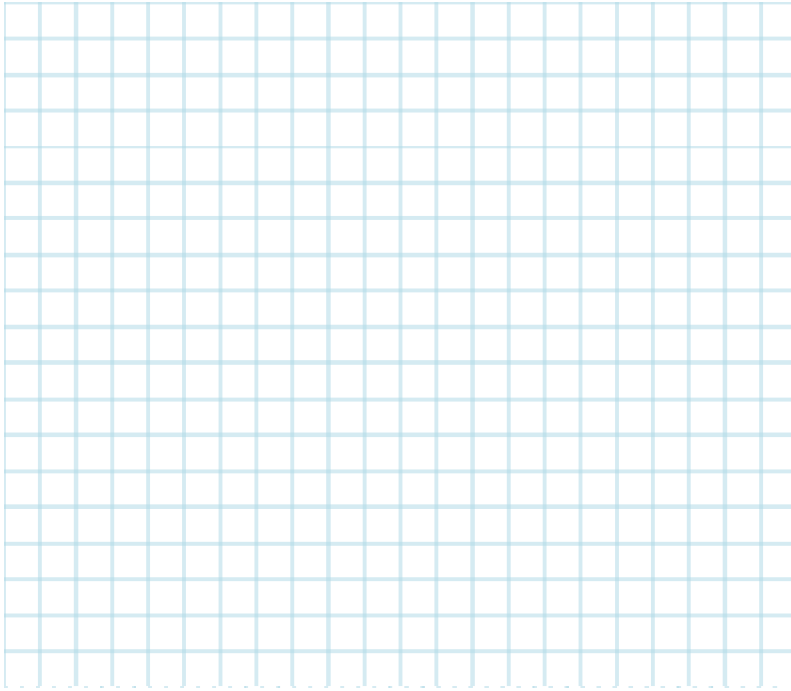
Constraints:
$x \geq 2$
$x \leq 6$
$y \geq 2$
$2x + y \leq 20$

Objective function:
$S = x - y$

4. A cafeteria offers pepperoni and vegetarian pizza slices. Pepperoni slices sell for $3.75 and vegetarian slices sell for $3.25. The manager noticed that every day they sell between 80 and 120 slices of vegetarian pizza. The total sales is never more than 300 slices. Creat a graph and calculate the maximum profit (P).
Let x represent the number of pepperoni slices sold.
Let y represent the number of vegetarian slices sold.
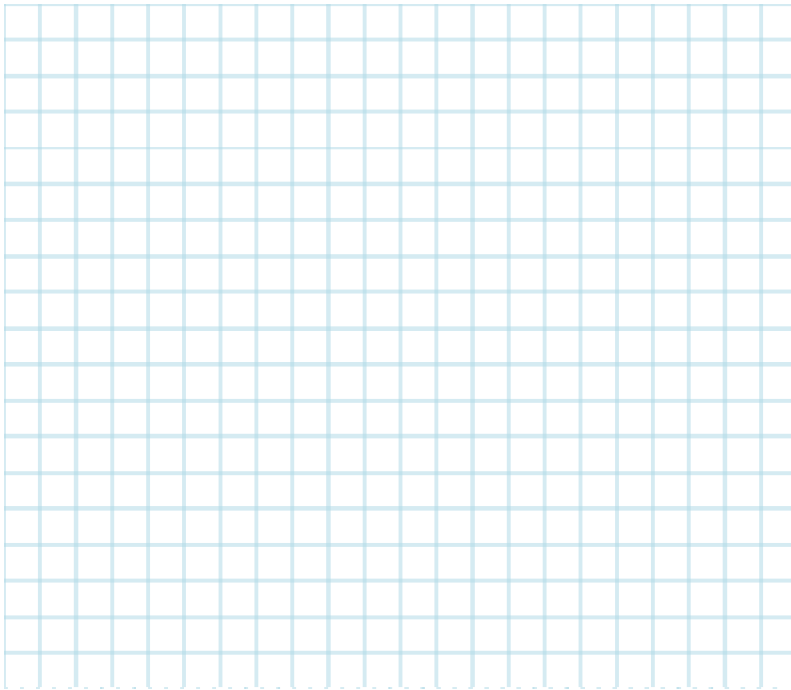
Constraints:
$x \geq 0$
$y \geq 80$
$y \leq 120$
$x + y \leq 300$
Objective function:
$P = 3.75x + 3.25y$

Bonus Problem

1. A Manitoba farmer is planting corn and barley.
    • He wants to plant no more than 200 ha altogether.
    • The farmer wants at most twice as many hectares of barley as corn.
    • The yield per hectare of corn averages 60 bushels, and the yield per hectare of barley averages 30 bushels.
    • Corn pays the farmer $8.50 per bushel, and barley pays $3.75 per bushel.
    Let b represent the number of hectares of barley.
    Let c represent the number of hectares of corn.
    Let R represent the revenue.

    The farmer wants to maximize the revenue.

    $b \geq 0$
    $c \geq 0$
    $b + c \leq 200$
    $2c \geq b$

    Objective function to maximize:
    $R = (30)(3.75)b + (60)(8.50)c$ *or* $R = 112.50b + 510c$

    Create a graph to represent this situation and calculate maximum revenue.