

Assignment-1

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1

$$|1| = 1 > 0$$

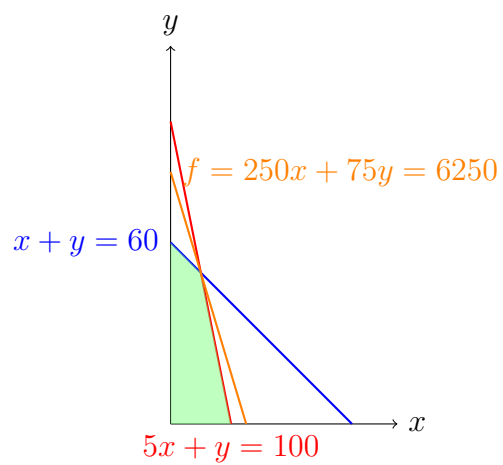
$$\begin{vmatrix} 1 & \alpha \\ \alpha & 4 \end{vmatrix} = 4 - \alpha^2 > 0, \alpha \in (-2, 2)$$

$$\begin{aligned} \begin{vmatrix} 1 & \alpha & -1 \\ \alpha & 4 & 2 \\ -1 & 2 & 4 \end{vmatrix} &= 1 \times 4 \times 4 + (-1) \times 2\alpha + (-1) \times 2\alpha \\ &\quad - (-1) \times 4 \times (-1) - 4\alpha^2 - 1 \times 2 \times 2 \\ &= -4\alpha^2 - 4\alpha + 8 \\ &= -4(\alpha^2 + \alpha - 2) > 0, \alpha \in (-2, 1) \end{aligned}$$

$$\therefore \alpha \in (-2, 1)$$

2

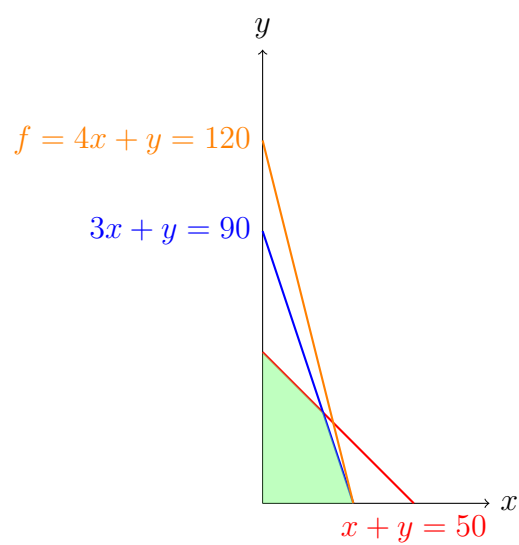
(a)



$$x = 10, y = 50,$$

$$\begin{aligned} \max f &= 250 \times 10 + 75 \times 50 \\ &= 6250 \end{aligned}$$

(b)



$$x = 30, y = 0,$$

$$\begin{aligned} \max f &= 4 \times 30 + 0 \\ &= 120 \end{aligned}$$

3

$$\begin{array}{ll} \text{minimize} & f = 5x + 7y \\ \text{s.t.} & \begin{cases} 2x + y & \geq 8 \\ x + 2y & \geq 10 \\ x, y & \geq 0 \end{cases} \end{array}$$

4

$$\begin{array}{ll} \text{minimize} & f = (16, 10, 15, 10, 12, 10)(x_{P,A}, x_{P,B}, x_{P,C}, x_{Q,A}, x_{Q,B}, x_{Q,C})^T \\ \text{s.t.} & \begin{cases} x_{P,A} + x_{Q,A} & \geq 5 \\ x_{P,B} + x_{Q,B} & \geq 5 \\ x_{P,C} + x_{Q,C} & \geq 4 \\ x_{P,A} + x_{P,B} + x_{P,C} & \leq 8 \\ x_{Q,A} + x_{Q,B} + x_{Q,C} & \leq 6 \\ x_{P,A}, x_{P,B}, x_{P,C}, x_{Q,A}, x_{Q,B}, x_{Q,C} & \geq 0 \end{cases} \end{array}$$