

1.2.5

$$1.8 \quad F = 300x_1 + 400x_2 \rightarrow \max;$$

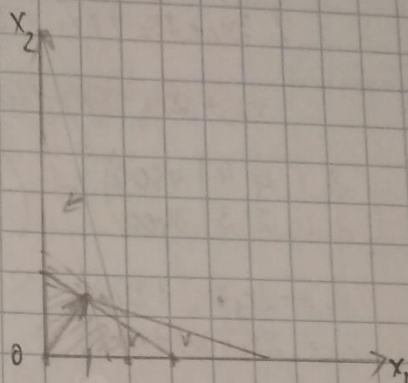
$$\begin{cases} 2x_1 + 3x_2 \leq 180; \\ 4x_1 + x_2 \leq 240; \\ 8x_1 + 12x_2 \leq 360; \\ x_1, x_2 \geq 0 \end{cases}$$

$$\text{grad } F \{300; 400\} = \vec{c};$$

$$\begin{cases} 2x_1 + 3x_2 = 180 \\ 4x_1 + x_2 = 240 \end{cases}$$

$$x_1 = 54; x_2 = 24; A(54; 24)$$

$$F(54; 24) = F_{\max} = 300 \cdot 54 + 400 \cdot 24 = 25800;$$



$$1.2 \quad Z = 15x_1 + 30x_2 \rightarrow \max;$$

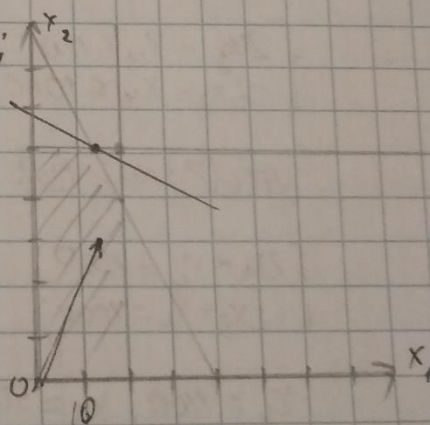
$$\begin{cases} 3x_1 \leq 60; \\ x_2 \leq 50; \\ 2x_1 + x_2 \leq 80; \end{cases}$$

$$\text{grad } Z \{15; 30\};$$

$$\begin{cases} x_2 = 50; \\ 2x_1 + x_2 = 80; \end{cases}$$

$$x_1 = 15; x_2 = 50.$$

$$f(x) = 15 \cdot 15 + 30 \cdot 50 = 1725.$$



$$2.10 \quad Z = 100x_1 + 120x_2 + 70x_3 + 30x_4 \rightarrow \min$$

$$\begin{cases} 3x_1 + x_2 + 4x_3 + 4x_4 = 4600 \\ 2x_1 + 2x_2 + 2x_3 + 3x_4 = 3400 \end{cases}$$

$$x_1 + 2x_2 + x_4 = 1200$$

$$\left(\begin{array}{cccc|c} 3 & 1 & 4 & 4 & 4600 \\ 2 & 1 & 2 & 3 & 3400 \end{array} \right) \sim \left(\begin{array}{cccc|c} 1 & 0 & 2 & 1 & 1200 \\ 0 & 1 & -2 & 1 & 1000 \end{array} \right)$$

$$x_1 = -2x_3 - x_4 + 1200$$

$$x_2 = 2x_3 - x_4 + 1000$$

$$Z = 100(-2x_3 - x_4 + 1200) + 120(2x_3 - x_4 + 1000) + 70x_3 + 30x_4 \rightarrow \min$$

$$Z = 100x_3 - 190x_4 + 220000 \rightarrow \min$$

$$\begin{cases} 2x_3 - x_4 \leq 1200; & 2x_4 \leq 2800; & x_4 \leq 1100; \\ -2x_3 + x_4 \leq 1000; \end{cases}$$

$$\text{grad } Z = \{100; -190\}$$

$$\begin{cases} 2x_3 + x_4 = 1200; \\ -2x_3 + x_4 = 1000; \end{cases}$$

$$x_4 = 1100; \quad x_3 = 50$$

$$Z(x) = 100 \cdot 50 - 190 \cdot 1100 + 240000 = 36500$$

