Carpenter x_1 tables

x_2 chairs

Maximize

$$5x_1 + 3x_2$$

labor 40 hours

x_1 2 hours $\quad 2x_1 + x_2 \leq 40$

x_2 1 hour

Materials 50

x_1 1 $\quad x_1 + 2x_2 \leq 50$

x_2 2

$$f(x) = c \cdot x \qquad \boxed{c = [5, 3]}$$

$$f(x) = \begin{bmatrix} 5 \\ 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = 5x_1 + 3x_2$$

$$Ax \leq a$$

$$\underbrace{\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}}_{A} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} \leq \underbrace{\begin{bmatrix} 40 \\ 50 \end{bmatrix}}_{a}$$

Maximize

$$5x_1 + 3x_2 - 2x_3$$

x_3 number of hours employee works

labor

$$2x_1 + x_2 \leq 40 + x_3$$

$$2x_1 + x_2 - x_3 \leq 40$$

$$c = [5, 3, -2]$$

$$A = \begin{bmatrix} 2 & 1 & -1 \\ 1 & 2 & 0 \end{bmatrix} \qquad a = \begin{bmatrix} 40 \\ 50 \end{bmatrix}$$