Exercises, lecture 2, 2.1

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2.1

(a)

$$\max \ w$$
$$\text{s.t.} \quad x \geq w \qquad (x - w \geq 0)$$
$$y \geq w \qquad (y - w \geq 0)$$
$$z \geq w \qquad (z - w \geq 0)$$
$$2x + 3y - z \geq 5$$
$$-3x - 4y + 2z \leq 3$$
$$x, y, z, w \geq 0$$

(b)

$$\min \ 2x - 3y$$
$$\text{s.t} \quad 2x + 3y \geq 5 - zM$$
$$3x - 4y \leq 3 + (1 - z)M$$
$$x, y \in \mathbb{N} \quad (x, y \in \mathbb{Z}_{\geq 0})$$
$$z \in \{0, 1\}$$

(c)

$$\begin{aligned} \min \quad & x + y \\ \text{s.t} \quad & x - 2z_1 - 5z_2 - 8z_3 - 200z_4 = 0 \\ & z_1 + z_2 + z_3 + z_4 = 1 \\ & 2x + 3y \geq 5 \\ & -3x - 4y \leq 3 \\ & z_1, z_2, z_3, z_4 \in \{0, 1\} \\ & y \in \mathbb{N} \quad (y \in \mathbb{Z}_{\geq 0}) \end{aligned}$$