

TUTORIAL 5

1. Write down the duals of the following linear programs:

(a)

$$\max z = 12x_1 + 6x_2 + 4x_3$$

$$0.9x_1 + 0.3x_2 + 0.1x_3 \leq 3000$$

$$0.1x_1 + 0.5x_2 + 0.3x_3 \leq 5000$$

$$0.2x_2 + 0.6x_3 \leq 10000$$

$$x_1, x_2, x_3 \geq 0$$

(b)

$$\max z = 2x_1 + 8x_2 + x_3$$

$$x_1 - x_2 + x_3 + 2x_4 \leq 10$$

$$2x_1 + x_2 + 3x_3 \geq 20$$

$$3x_2 + x_3 - x_4 = 8$$

$$x_1 \in \mathbb{R}, x_2, x_3, x_4 \geq 0$$

(c)

$$\max 3x_1 + 2x_2 - x_4$$

$$4x_1 + 3x_2 + x_3 = 10$$

$$5x_1 - 6x_2 + x_3 \leq 12$$

$$6x_1 + 7x_2 \geq 11$$

$$x_1, x_3, x_4 \geq 0, x_2 \in \mathbb{R}$$