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Q6. Use complementary slackness

$$\max\ 3.1x_1 + 10x_2 + 8x_3 - 45.2x_4 + 18x_5$$
$$x_1 + x_2 + x_3 - x_4 + 2x_5 \le 5$$
$$2x_1 - 4x_2 + 1.2x_3 + 2x_4 + 7x_5 \le 16$$
$$x_1 + x_2 - 3x_3 - x_4 - 10x_5 \le 20$$
$$3x_1 + x_2 + 3x_3 + \tfrac{3}{2}x_4 + \tfrac{7}{3}x_5 \le 10$$
$$x_2 + x_3 + 6x_4 + 2x_5 \le 4.5$$
$$2x_3 - x_4 + x_5 \le 2$$
$$x_1, \dots, x_5 \ge 0$$

Dual is

$$\min\ 5y_1 + 16y_2 - 20y_3 + 10y_4 + 4.5y_5 + 2y_6$$
s.t.
$$y_1 + 2y_2 + y_3 + 3y_4 \ge 3.1$$
$$y_1 - 4y_2 + y_3 + 1y_4 + y_5 + 2y_6 \ge 10$$
$$y_1 + 1.2y_2 - 3y_3 + 3y_4 + y_5 \ge 8$$
$$-y_1 + 2y_2 - y_3 + 1.5y_4 + 6y_5 \ge -45.2$$
$$2y_1 + 7y_2 - 10y_3 + \tfrac{7}{3}y_4 + 2y_5 \; y_6 \ge 18$$

Using the thm
If the primal is feasible and the cost is bounded, the dual is aswell and it's cost is also bounded. Additionally, their optimum are the same.

Since both the primal and dual are feasible and bound they share optimum solns.
Therefore, $x_1 = x_3 = 0.5$, $x_2 = x_4 = 0$, $x_5 = 2$ is optimal