AMS 540: *Linear Programming*

Problem Set 1
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Problem 1:

Formulate an LP to maximize Eastinghouse's daily profit

Solution:

Define

$$x_1 := Number\ of\ workers\ from\ 8am - 4pm\ shift$$
$$x_2 := Number\ of\ workers\ from\ 4pm - 12am$$
$$x_3 := Number\ of\ workers\ form\ 12am - 8am$$

To maximize Eastinghouse's daily profit, I define $profit$ as:

$$profit = (18 * 10 - 12 * 8)x_1 + (22 * 9 - 16 * 8)x_2 + (24 * 12 - 20 * 8)x_3$$

The linear program is:

$$\begin{aligned} maximize\ & (18 * 10 - 12 * 8) \\ subject\ to\ \ & x_1 \leq 10 \\ & x_2 \leq 10 \\ & x_3 \leq 10 \\ & x_1 + x_2 + x_3 \leq 25 \\ & 10x_1 + 9x_2 + 12x_3 \leq 250 \\ & 4(10)x_1 + 3(9)x_2 + 2(12)x_3 \leq 3(10x_1) + 3(9x_2) + 3(12x_3) \\ & x_1 \geq 0,\ x_2 \geq 0,\ x_3 \geq 0 \end{aligned}$$