Math 132A HW 1

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1 Part One

1.1 Problem One

The decision variables for this problem are x_{ij} if employee i is assigned job j and is only equal to zero or one. The objective function is to minimize

$$\sum_{i=1}^{4}\sum_{j=1}^{4} c_{ij}x_{ij}$$

or the number of hours elapsed after all the jobs have been completed. It is subject to the following constraints:

$$0 \leq x_{ij} \leq 1$$

$$\sum_{i=1}^{4} x_{ij} = 1$$

$$\sum_{j=1}^{4} x_{ij} = 1$$

2 Part Two

2.1 Exercise One

2.1.1 Formulation

The decision variables for this problem are x_i where $i \in \{1, 2\}$ and 1 is a comedy commercial and 2 is a football commercial and x_i indicates the number of commercials to buy. The objective function is to minimize $50000x_1 + 100000x_2$, or the total cost of the commercials, subject to the following constraints:
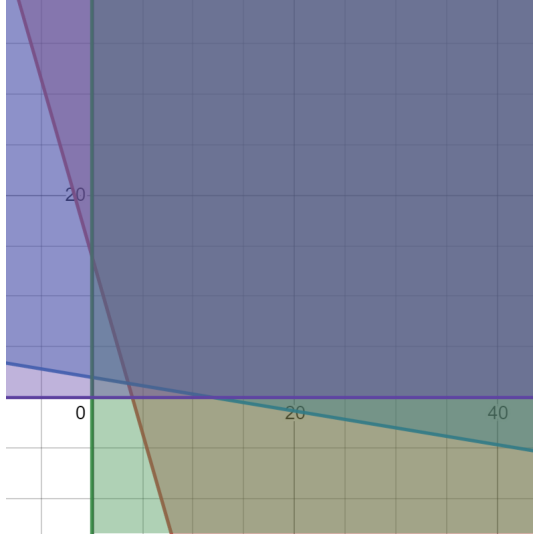
$$7x_1 + 2x_2 \geq 28$$
$$2x_1 + 12x_2 \geq 24$$
$$x_1, x_2 \geq 0$$
$$x_1, x_2 \in \mathbb{N}$$

2.1.2   Feasible Region

2.1.3   Points

An example of a feasible solution is $x_1 = 20$, $x_2 = 20$. An example of an infeasible solution is $x_1 = 2$, $x_2 = 4$.

2.2   Exercise Three

The decision variables in this problem are x_i with $i \in \{1, 2, 3, 4\}$ where x_i represents the number of kilograms of compound i to use.
The objective function is to minimize $20x_1 + 30x_2 + 20x_3 + 15x_4$, or the cost of blending, which is subject to the following constraints:

$$35x_1 + 15x_2 + 35x_3 + 25x_4 = 25$$
$$20x_1 + 65x_2 + 35x_3 + 40x_4 \geq 35$$
$$40x_1 + 15x_2 + 25x_3 + 30x_4 \geq 20$$
$$x_1 \leq 25$$
$$x_2 \leq 30$$
$$x_1, x_2, x_3, x_4 \geq 0$$