

Linear Programming Assignment I

1. State in the standard form:

$$\begin{aligned} & \text{minimize} && -8x_1 + 9x_2 + 2x_3 - 6x_4 - 5x_5 \\ & \text{subject to} && -6x_1 + 6x_2 - 10x_3 + 2x_4 - 8x_5 \geq 3 \\ & && x_1, x_2, x_3, x_4, x_5 \geq 0 \end{aligned}$$

2. Find necessary and sufficient conditions for the numbers s and t to make the LP problem

$$\begin{aligned} & \text{minimize} && x_1 + x_2 \\ & \text{subject to} && sx_1 + tx_2 \geq 3 \\ & && x_1, x_2 \geq 0 \end{aligned}$$

- (a) have an optimal solution
(b) be infeasible
(c) be unbounded
3. The Omar Dress Company can make a pantsuit out of one yard of cotton and three yards of nylon and can make a dress out of two yards of each. The company has 90 yards of cotton and 150 yards of nylon. What combination of pantsuits and dresses should be made to maximize receipts if a pantsuit sells for \$45 and a dress for \$30? What is the maximum?
4. If in the last problem cotton costs \$0.90 a yard and nylon costs \$1.10 a yard for any material used, find the combination of pantsuits and dresses that produces the greatest return to the company, and determine that return.
5. If pantsuits require two hours each to produce, and dresses require one hour each and labor costs \$5 per hour, find the number of pantsuits and dresses that produce the greatest profit, and the new profit.

6. A meat packing plant produces 480 hams, 400 pork bellies, and 230 picnic hams every day; each of these products can be sold either fresh or smoked. The total number of hams, bellies, and picnics that can be smoked during a normal working day is 420; in addition, up to 250 products can be smoked on overtime at a higher cost. The *net* profits are as follows:

	Fresh	Smoked (regular)	Smoked (overtime)
Hams	\$8	\$14	\$11
Bellies	\$4	\$12	\$7
Picnics	\$4	\$13	\$9

For example, the following schedule yields a total net profit of \$9,965:

	Fresh	Smoked (regular)	Smoked (overtime)
Hams	165	280	35
Bellies	295	70	35
Picnics	55	70	105

Find the schedule that maximizes the total profit.