Optimizing Methods
Second List of Problems

1. Solve the following LP by using graphically method presented on lecture 2 if

   (a)

$$\begin{aligned} \max\ & 6x_1 + 4x_2 \\ \text{subject to}\ & 3x_1 + 2x_2 \leqslant 8 \\ & -4x_1 + 9x_2 \leqslant 206 \\ & x_1, x_2 \geqslant 0. \end{aligned}$$

   (b)

$$\begin{aligned} \min\ & 2x_1 - 4x_2 \\ \text{subject to}\ & 3x_1 + x_2 \leqslant 1 \\ & -2x_1 + x_2 \geqslant 3 \\ & x_1, x_2 \geqslant 0. \end{aligned}$$

2. A refinery has two crude oil materials with which to create gasoline and lube oil:

   (a) Crude A costs \$28/bbl and 18,000 bbl are available.

   (b) Crude B costs \$38/bbl and 32,000 bbl are available.

   The yield and sale price per barrel of the products and the associated markets are shown in table below. Formulate the problem, which answers on the question "How much crude A and B should be used to maximize the profit of the company?".

	Yield/bbl		*Sale Price/bbl*	*Market/bbl*
Product	*Crude A*	*Crude B*		
gasoline	$0,6$	$0,85$	\$60	20000
lube oil	$0,4$	$0,15$	\$130	12000

3. Products I and II that are manufactured by a firm are sold at the rate of \$2 and \$3, respectively. Both products have to be processed on machines A and B. Product I requires 1 minute on A and 2 minutes on B where as Product II requires 1 minute on each machine. Machine A is not available for more than 6 hours 40 minutes/day, where as machine B is not available for more than 10 hours. Formulate the problem for profit maximization.

4. There are many drug manufacturers producing various combinations for a similar ailment. Now a doctor wishes to prescribe a combination dosage such that the cost is minimum so that it could be given to poor patients. Drug A costs 50 cents, Drug B costs 20 cents, Drug C 30 cents, and Drug D 80 cents per tablet, respectively. Daily requirements are 5 mg of Medicine 1, 6 mg Medicine 2, 10 mg Medicine 3, and 8 mg Medicine 4. The prescribed composition of each drug is given in the table above. Write the prescription that satisfies the medicinal requirements at minimum cost.

Drug	*Medicine 1*	*Medicine 2*	*Medicine 3*	*Medicine 4*
A	4	3	2	2
B	2	2	2	4
C	1,5	0	4	1
D	5	0	4	5