1. I have been approached by three telephone companies to subscribe to their long-distance service in the United States. MaBell will charge a flat $16 per month plus $.25 a minute. PaBell will charge $25 a month but will reduce the per-minute cost to $.21. As for BabyBell, the flat monthly charge is $18, and the cost per min is $.22. I usually make an average of 200 minutes of long-distance calls a month. Assuming that I do not pay the flat monthly fee unless I make calls and that I can apportion my calls among all three companies as I please, how should I use the three companies to minimize my monthly telephone bill?

2. Suppose that you have 7 full wine bottles, 7 half-full, and 7 empties. You would like to divide the 21 bottles among three individuals so that each will receive exactly 7. Additionally, each individual must receive the same quantity of wine. Express the problem as ILP constraints and find a solution. (Hint: Use a dummy objective function with all zero coefficients.)

3. Ulern University uses a mathematical model that optimizes student preferences taking into account the limitation of classroom and faculty resources. To demonstrate the application of the model, consider the simplified case of 10 students who are required to select two courses out of six offered electives. The table below gives scores that represent each student's preference for individual courses, with a score of 100 being the highest. For simplicity, it is assumed that the preference score for a two-course selection is the sum of the individual score. Course capacity is the maximum number of students allowed to take the class.

Preference score for course						
Student	1	2	3	4	5	6
1	20	40	50	30	90	100
2	90	100	80	70	10	40
3	25	40	30	80	95	90
4	80	50	60	80	30	40
5	75	60	90	100	50	40
6	60	40	90	10	80	80
7	45	40	70	60	55	60
8	30	100	40	70	90	55
9	80	60	100	70	65	80
10	40	60	80	100	90	10
Course capacity	6	8	5	5	6	5

Formulate the problem as an ILP and find the optimum solution.

4. Jobco is planning to produce at least 2000 widgets on three machines. The minimum lot size on any machine is 600 widgets. The following table gives the pertinent data of the situation.

Machine	Setup cost($)	Production cost/unit ($)	Capacity (units)
1	300	2	650
2	100	10	850
3	200	5	1250

Formulate the problem as an ILP and find the optimum solution.