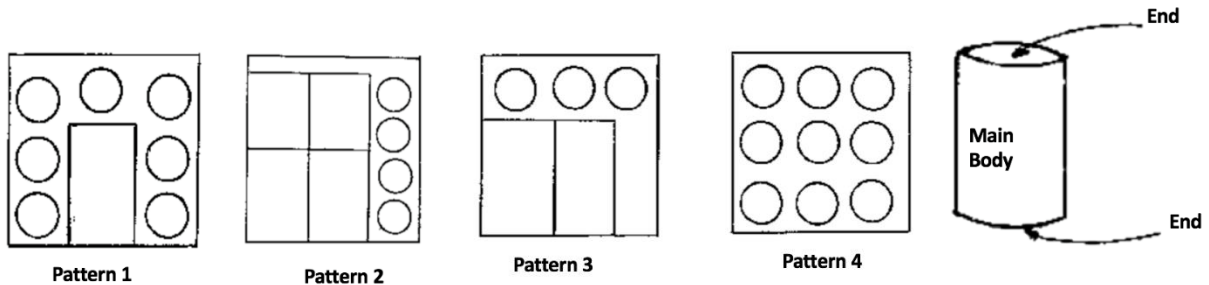


**ITY512E OPERATIONS RESEARCH I
HOMEWORK 1**

1) ABC company (which mainly produces cans for TAT) tries to find the best possible production level in order to maximize their profit. Can production is made by stamping metal sheets. One thin can consists of 2 end parts and one main body. These three parts can be obtained by 4 possible patterns (there are 2 different size of metal sheet) as follows;



Additionally, the following information related to patterns is given by the manager;

	Pattern			
	1	2	3	4
Type of sheet used	1	2	1	1
Number of main bodies	1	4	2	0
Number of ends	7	4	3	9
Scrap Level	S_1	S_2	S_3	S_4
Time for stamping process (hours)	t_1	t_2	t_3	t_4

(While writing LP model please use the following notations; the profit gathered from selling one can is denoted by “\$P”, the cost per unit of scrap is denoted by “\$C”. Let “T” be the the total number of hours available per week, “L1” be the number of metal sheets of type 1 (that are available for stamping for 1 week) and “L2” be the number of metal sheets of type 2 (that are available for stamping for 1 week).

Do not forget that;

- At the start of the week there is nothing in stock.
- Each (unused) main body in stock at the end of the week incurs a stock-holding cost of c_1 .
- Each (unused) end in stock at the end of the week incurs a stock-holding cost of c_2 . Assume that all cans produced one week are sold that week.

Write the LP model that gives the optimal cans production level per week (Please identify and explain decision variables, objective function and constraints clearly).

2) Suppose that you are an investor that has \$100 at the beginning of the week. You have only one investment pattern as follows:

If you invest x dollars on the day of investment, then you have to make additional $x/2$ investment on the following day. Then you will gain a total return of $2x$ dollars on the third day (Which means, on the third day with a total investment of $1.5x$ dollars, you receive $2x$ dollars and your revenue will be $0.5x$ dollars) Write an LP model that maximize your revenue on 6.day of a week by investing on the next 5 consecutive days (starting from Monday) in a week (Note that investments can only made in weekdays).To facilitate the formulation of a linear program, the investor decides to make the following simplifying assumptions:

1. If an initial investment is not matched on the subsequent day, the initial investment is lost.
2. Any return that is due on any given day can be reinvested immediately.
3. Borrowing money is not allowed.