

# [Master of business administration assignment](https://assignbuster.com/master-of-business-administration-assignment/)

Linear programming is a specific case of mathematical programming (mathematical optimization). More formally, linear programming is a technique for the optimization of a linear objective function, subject to linear equality and linear inequality constraints. (b) A toy company manufactures two types of dolls, a basic version doll- A and a deluxe version doll-B. Each doll of type B takes twice as long to produce as one of type A, and the company would have time to make maximum of 1000 per day. The supply of plastic Is sufficient to produce 1000 dolls per day (both A & B combined).

The deluxe version requires a fancy dress for which there are only 500 per day available. If the company makes a profit of RSI 3. 0 and RSI 5 per doll, respectively on doll A and B, then how many of each doll should be produced per day in order to maximize the total profit. Formulate this problem. NAS. Let XSL and XX be the number of dolls produced per day of type A and B, respectively. Let the A require t hrs. So that the doll B require at hrs. So the total time to manufacture XSL and XX dolls should not exceed 20th hrs. Therefore, txt + text 20th Other constraints are simple.

Then the linear programming problem becomes: Maximize p = +EX. Subject to restrictions, XSL + XX 1500 (Plastic constraint) XX 600 (Dress constraint) And non-negatively restrictions 2. What are the advantages of Linear programming techniques? NAS. Advantages? 1 . The linear programming technique helps to make the best possible use of available productive resources (such as time, labor, machines etc. ) 2. It improves the quality of decisions. The individual who makes use of linear programming methods becomes more objective than subjective. 3.

It also helps in providing better tools for adjustment to meet changing conditions. 4. In a production process, bottle necks may occur. For example, in a factory some machines may be in great demand while others ay lie idle for some time. A significant advantage of linear programming is highlighting of such bottle necks. 5. Most business problems involve constraints like raw materials availability, market demand etc. Which must be taken into consideration. Just we can produce so many units of product does not mean that they can be sold. Linear programming can handle such situation also. 3.

Write a note on Monte-Carlo simulation. NAS. Simulation is also called experimentation in the management laboratory. While dealing with business problems, simulation is often referred to as ‘ Monte Carlo Analysis’. Two American mathematicians, Von Neumann and Ulna, in the late asses found a problem in the field of nuclear physics too complex for analytical solution and too dangerous for actual experimentation. They arrived at an approximate solution by sampling. The method they used had resemblance to the gambler’s betting systems on the roulette table, hence the name ‘ Monte Carlo’ has stuck.

Imagine a betting game where the stakes are based on correct prediction of the number of heads, which occur when five coins are tossed. If it were only a question of one coin; most people know that there is an equal likelihood of a head or a tail occurring, that is the probability of a head is h. However, without the application of probability theory, it would be difficult to predict the chances of getting various numbers of heads, when five coins are tossed. Why don’t you take five coins and toss them repeatedly.

Note down the outcomes of each toss after every ten tosses, approximate the probabilities of various outcomes. As you know, the values of these probabilities will initially fluctuate, but they would tend to stabilize as the number of tosses are increased. This approach in effect is a method of sampling, but is not very invention. Instead of actually tossing the coins, you can conduct the experiment using random numbers. Random numbers have the property that any number is equally likely to occur, irrespective of the digit that has already occurred.

Let us estimate the probability of tossing of different numbers of heads with five coins. We start with set random numbers given below: Table: Random number set 78466 | 71923 | 78722 | 78870 | 06401 | 61208 | 97118 195983 1 By following a convention that “ even” digits signify a head (H) and the “ odd” digits represent a tail (T), the tossing of a coin can be simulated. The probability of occurrence of the first set of digits is h and that of the other set is also h – a condition corresponding to the probability of the occurrence of a head and the probability of occurrence of a tail respectively.

It is immaterial as to which set of five digits should signify a head. The rule could be that the digits O, 1, and 4 represent a head and the digits 5, 6, 7, 8 and 9 a tail. It is only necessary to take care that the set of random numbers allotted to any event matches with its probability of occurrence. For instance, if you’re interested in allotting random numbers to three vents A, B and C with respective probabilities 0. 24, 0. 36 and 0. 40, choose two digit random numbers 00 to 99. The numbers 00 to 23 signify event A, 24 to 59 signify B and 60 to 99 signify C.

The first set of five random digits in the list of random numbers implies that the outcome of the first toss of 5 coins is as follows: Table: Outcome of first toss of 5 coins com | 1 12 13 14 15 1 Random Number 17 18 14 16 outcome IT II II II II I Hence it is 4 heads and 1 tail. 16 4. Use Branch and Bound technique to solve the following problem Measurements = +312 + 1313 Subject to – +612+713 EX. – And x] are integer J = 1, 2, 3 5. Explain the different steps involved in simulation methodologies? NAS. The methodology developed for simulation process consists of the following seven steps: Step 1: Identify and clearly define the problem.

Step 2: List the statement of objectives of the problem. Step 3: Formulate the variables that influence the situation and an extract or probabilistic description of their possible values or states. Step 4: Obtain a consistent set of values (or states) for the variables, I. E. , a sample of probabilistic variables, random sampling technique maybe used. Step 5: Use the sample obtained in step 2 to calculate the values of the decision criterion, by actually following the relationships among the variables for each of the alternative decisions. Step 6: Repeat steps 2 and 3 until a sufficient number of samples are available.

Step 7: Tabulate the various values of the decision criterion and choose the best policy. NAS. Though there are no essential differences between PERT and CPM as both of them share in common the determination of a critical path. Both are based on the network representation of activities and their scheduling that determines the most ritual activities to be controlled so as to meet the completion date of the project. PERT Some key points about PERT are as follows: 1 . PERT was developed in connection with an R; D work. Therefore, it had to cope with the uncertainties that are associated with R; D activities.

In PERT, the total project duration is regarded as a random variable. Therefore, associated probabilities are calculated so as to characterize it. 2. It is an event-oriented network because in the analysis of a network, emphasis is given on the important stages of completion of a task rather than the activities required to be performed to reach a reticular event or task. 3. PERT is normally used for projects involving activities of non-repetitive nature in which time estimates are uncertain. 4. It helps in pinpointing critical areas in a project so that necessary adjustment can be made to meet the scheduled completion date of the project.

CPM 1 . CPM was developed in connection with a construction project, which consisted of routine tasks whose resource requirements and duration were known with certainty. Therefore, it is basically deterministic. 2. CPM is suitable for establishing a trade-off for optimum balancing between schedule time and cost of the project. . CPM is used for projects involving activities of repetitive nature. Master of Business Administration – Semester 2 MEMBER: “ Operations Research” (kick ID: 81301) ASSIGNMENT- set 2 Note: Each Question carries 10 marks 1 .

Define Operations Research. Discuss different models available in OR. NAS. The term Operations Research (OR) describes the discipline that is focused on the application of information technology for informed decision-making. In other words, OR represents the study of optimal resource allocation. The goal of OR is to provide rational bases for decision making by seeking to understand and structure employ situations, and to utilize this understanding to predict system behavior and improve system performance.

Much of the actual work is conducted by using analytical and numerical techniques to develop and manipulate mathematical models of organizational systems that are composed of people, machines, and The various types of models used in operations research are:- 1. 6. 1 A broad classification of OR models You can broadly classify OR models into the following types. A. Physical Models include all form of diagrams, graphs and charts. They are designed to tackle specific problems. They bring out significant factors and interrelationships in pictorial form to facilitate analysis. There are two types of physical models: l. Iconic models II.

Analog models Iconic models are primarily images of objects or systems, represented on a smaller scale. These models can simulate the actual performance of a product. Analog models are small physical systems having characteristics similar to the objects they represent, such as toys. B. Mathematical or Symbolic Models employ a set of mathematical symbols to represent the decision variable of the system. The variables are related by thematic systems. Some examples of mathematical models are allocation, sequencing, and replacement models. C. By nature of Environment: Models can be further classified as follows: I.

Deterministic model in which everything is defined and the results are certain, such as an EX. model. II. Probabilistic Models in which the input and output variables follow a defined probability distribution, such as the Games Theory. D. By the extent of Generality Models can be further classified as follows: I. General Models are the models which you can apply in general to any problem. For example: Linear programming. II. Specific Models on the other hand are models that you can apply only under specific conditions. For example: You can use the sales response curve or equation as a function of only in the marketing function. . Write dual of Max EX. +EX. subject to +XX4 Yell +AY+AY> 5 3. Solve the following Assignment Problem operations 110 115 112 Ill I 01 02 19 110 19 112 1 03 115 116 116 117 1 NAS. Since the number of rows are less than number of columns, adding a dummy row and applying Hungarian method, Row reduction matrix operations I MI I MM 1 MM 1 MM 1 01 110 115 112 Ill 04 10 10 10 10 1 Optimum assignment solution 01 | [0] 15 12 II 02 | XSL | [0] 13 1 03 II | [0] lax 04 laxly[0] I Hungarian Method leads to multiple solutions.

Selecting (03, MM) arbitrarily. III- MI 02 – MM 03 – MM 04 – MM TOTAL 10 35 Therefore, the optimum assignment schedule is 01 4. Expiate PERT NAS. Some key points about PERT are as follows: – MI, 02 – MM, 03 – MM AND 04 – probabilities are calculated so as to characterize it. 2. It is an event-oriented network because in the analysis of a network, emphasis is even on the important stages of completion of a task rather than the activities required to be performed to reach a particular event or task. 3. PERT is normally used for projects involving activities of non-repetitive nature in which time estimates are uncertain. . It helps in pinpointing critical areas in a project so that necessary adjustment can be made to meet the scheduled completion date of the project. Project scheduling by PERT-CPM It consists of three basic phases: planning, scheduling and controlling. 1 . Project Planning: In the project planning phase, you need to perform the following activities: I) Identify various tasks or work elements to be performed in the project. It) Determine requirement of resources, such as men, materials, and machines, for carrying out activities listed above. Iii) Estimate costs and time for various activities. V) Specify the inter-relationship among various activities. V) Develop a network diagram showing the sequential inter-relationships between the various activities. 2. Project Scheduling: Once the planning phase is over, scheduling of the project is when each of the activities required to be performed, is taken up. The various steps involved during this phase are listed below: 1. Estimate the durations of activities. Take into account the resources required for these execution in the most economic manner. 2. Based on the above time estimates, prepare a time chart showing the start and finish times for each activity.

Use the time chart for the following exercises. To calculate the total project duration by applying network analysis techniques, such as forward (backward) pass and floats calculation To identify the critical path To carry out resource smoothing (or leveling) exercises for critical or scarce sources including re-costing of the schedule taking into account resource constraints. 3. Project Control: Project control refers to comparing the actual progress against the schedule the project to update or revise the uncompleted part of the project. 5.

Explain Maximizing-maxima principle NAS. Maximum – Maxima Principle Solving a two-person zero-sum game Player A and player B are to play a game without knowing the other player’s strategy. However, player A would like to maximize his profit and player B would like to minimize his loss. Also each player would expect his opponent to be calculative. Suppose player A plays AY . Then, his gain would be al 1, AAA, , al n, accordingly Bi’s choice would be Bal, BE, , Bin. Let al = min {all, AAA, , Alan. Then, al is the minimum gain of A when he plays AY (al is the minimum pay-off in the first row. Similarly, if A plays AY, then his minimum gain is 02, the least pay-off in the second row. You will find corresponding to Ass play AY, AY, , Am, the minimum gains are the row minimums al, 02, , am. Suppose A chooses the course of action where AI is maximum. Then the maximum of the row minimum in the pay-off matrix is called maximum. The maximum is a = Max I { min J (ail) } Similarly, when B plays, he would minimize his maximum loss. The maximum loss to B is when B] is P] = Max I (ail ). This is the maximum pay-off in the J the column. The minimum of the column maximums in the pay-off matrix is called maxima.

The maxima is p = min J { Max I (ail) } If a = = v (say), the maximum and the maxima are equal and the game is said to have saddle point. If a ; p, then the game does not have a saddle point. Saddle point In a two-person zero-sum game, if the maximum and the maxima are equal, the game has saddle point. Saddle point is the position where the maximum (maximum of the row minimums) and maxima (minimum of the column maximums) coincide. If the maximum occurs in the Roth row and if the maxima occurs in the SST column, the position (r, s) is the saddle point.

Here, v = ears is the common value of the maximum and the maxima. It is called the value of the game. The value off game is the expected gain of player A, when both the players adopt optimal strategy. Note: If a game has saddle point, (r, s), the player’s strategy is pure strategy. Solution to a game with saddle point Consider a two-person zero-sum game with players A and B. Let AY, AY, , Am be the courses of action for player A. Let 81, 82, , Bin be the courses of action for player B. The saddle point of the game is as follows: 1 . The minimum pay-off in each row of the pay-off matrix is encircled. 2.

The maximum pay-off in each column is written within a box. Corresponding position is the saddle point. Let (r, s) be the saddle point. Then, the suggested pure strategy for player A is Ar. The suggested pure strategy for player B is BBS. The value of the game is ears. Note: However, if none of the pay-offs is circled or coxed, the game does not have a saddle point. Hence, the suggested solution for the players is mixed strategy. 6. Write short notes on the following: a. Linear Programming NAS. Linear programming focuses on obtaining the best possible output (or a set of outputs) from a given set of limited resources.

The ALP is a class of mathematical programming where the functions representing the objectives and the constraints are linear. Optimization refers to the minimization or minimization of the objective functions. You can define the general linear programming model as follows: Maximize or Minimize: = XIX + Cox + +CNN Subject to the constraints, al XIX + axes + + al nix -bal axes + + + annex – be mammal + mammas + + minx ? BMW and XSL, XX, CNN 2 0 Where, c], bi and ail (I = 1, 2, 3, m,] = 1, 2, 3 ? n) are constants determined from the technology of the problem and X] O = 1, 2, 3 n) are the decision variables.

Here ? is either (less than), (greater than) or = (equal). Note that, in terms of the above formulation the coefficients c], bi and ail are interpreted physically as follows. If bi is the available amount of resources I, where ail is the amount of resource I that must e allocated to each unit of activity J, the “ worth” per unit of activity is equal to c]. B. Transportation Problem NAS. Transportation model is an important class of linear programs.

For a given supply at each source and a given demand at each destination, the model studies the minimization of the cost of transporting a commodity from a number of sources to several destinations. The transportation problem involves m sources, each of which has available AI (I = 1, 2… M) units of homogeneous product and n destinations, each of which requires b] O = 1, 2…. , n) units of products. Here AI and b] are positive integers. The cost CIA of transporting one unit of the product from the tit source to the Jot destination is given for each I and J.

The objective is to develop an integral transportation schedule that meets all demands from the inventory at a minimum total transportation cost. It is assumed that the total supply and the total demand are equal. Mimi= l AI = an= l b] The condition (1) is guaranteed by creating either a fictitious destination with a demand equal to the surplus if total demand is less than the total supply or a (dummy) source with a supply equal to the shortage if total demand exceeds total room all destinations to the fictitious sources are assumed to be zero so that total cost of transportation will remain the same.