Integer Programming

An integer programming problem is a mathematical optimization or feasibility program in which some or all the variables are restricted to be integers.

For Example: consider a company that sells various consumer items needs to decide how many of each to manufacture per month in order to maximize profit. In this type of problem, the variables represent quantities of discrete items, such as cars or television sets, which must be integers.

Consider the below mentioned problem.

Problem Statement

The following table lists the pilot staffing needs for the following six months. The cost of a pilot's salary is $ 8 per month. At the beginning of Month 1 the airline has a staff of 20 pilots, but this staff can be adjusted each month. Pilots can be hired and fired at the beginning of each month. Newly hired pilots can start working at the same month, and fired pilots stop working the same day they are fired. The cost of firing a pilot is $10, and the hiring cost is of $5 per pilot. If it is convenient, the airline can have a staff of pilots larger than the actual needs.

Define an Integer programming model to obtain the pilots to hire and fire each month to minimize the total cost of pilot staff.

Modify the linear model to include the constraint that the airline cannot fire pilots if it has hired pilots the previous month.

Period	1	2	3	4	5	6
Pilots Needed	30	60	55	40	45	50