

1 LP Model - and Solve using AMPL

23 patients have been admitted to Cambridge Memorial Hospital for emergency treatment. (They are numbered P_1, \dots, P_{23} .) Each one of the 23 patients requires a transfusion of one unit of blood restricted by blood type. (We ignore positive or negative blood types.) The number of patients of each blood type is given in Table 1. The available supply of each blood

Blood Types	A	B	O	AB
Number of Patients	7	6	5	5

Table 1:

type is given in Table 2. A patient of one blood type can only accept transfusions of certain

Blood Types	A	B	O	AB
Supply Available	5	4	11	4

Table 2:

types, as indicated in Table 3.

Patient Blood Type	A	B	O	AB
Acceptable Donor Blood Type	A,O	B,O	O	A,B,O,AB

Table 3:

1. Formulate the problem of finding an acceptable distribution of blood as a linear program.¹
2. Solve with AMPL. (Write a general model, i.e. use sets and parameters. You can use *subsets* as well. For an example see page 10 in www.unc.edu/~pataki/hhh/ampl/amplhandout.pdf.)
3. Suppose that the tables with the number of patients and the supply are changed to that in the Tables 4 and 5, respectively. However, new patients with blood type A are not expected to arrive. Therefore, solve the same problem but ensure that the supply of type A is completely used up before the supply of type O is completely used up.

¹Hint: Recall the transportation problem. Also, you can translate the AMPL problem in part 2 into an LP model using mathematical notation.

Blood Types	A	B	O	AB
Number of Patients	5	6	8	5

Table 4:

Blood Types	A	B	O	AB
Supply Available	6	4	14	4

Table 5: