

Fun with Graphs

Problem # 6

There are many problems that can be formulated as max flow problems. Consider for example the following problem. A hospital is trying to evaluate whether its blood supply is sufficient for next week.

Patients with blood type A can receive a blood transfusion from blood type A or O. Patients with blood type B can receive a blood transfusion from blood type B or O. Patients with blood type AB can receive any blood type (universal recipient) and patients with blood type O can only receive blood type O (universal donor).

The hospital currently has 50 units of blood type O, 36 units of blood type A, 11 units of type B, and 8 units of type AB. They estimate that they will need 45 units of blood type O, 42 units of blood type A, 8 units of type B, and 3 units of type AB.

Are the 105 units of blood available at the hospital enough to meet the projected demand of 100 units?

Think how to formulate this question as a max flow problem. What are the nodes, arcs and the flow capacities on the arcs?