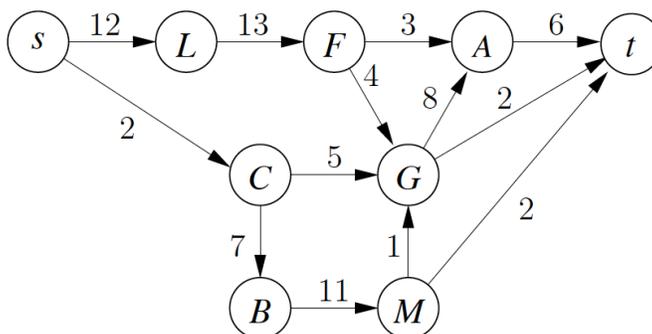


Lecture At the lecture we will talk more about network flows. We will talk about Edmond-Karps algorithm and matchings in bipartite graphs. You should read CLRS chapter 26.2-26.3.

Exercises

Ford-Fulkersons algorithm Compute a maximum flow and minimum cut on graph below.



CLRS Solve CLRS 26.1-6, 26.1-7, 26.2-2, 26.2-11, Problem 26-1.

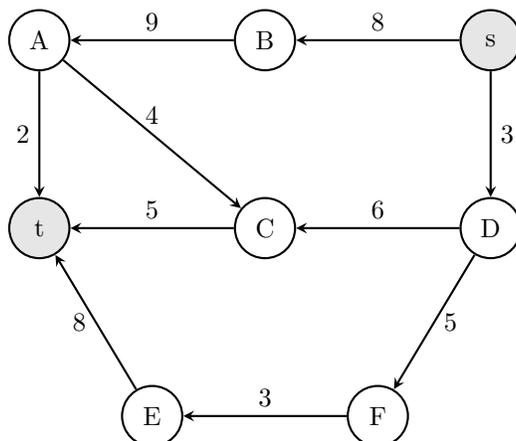
Implementation of maximum flow [CJ] Implement a program that given a flow network calculates the maximum flow between two given nodes using the Ford-Fulkerson algorithm.

Puzzle of the week: Four Coins You have to win a game against the hangman. Before the game starts you are blindfolded. There are four coins placed on a square table, one coin at each corner. The initial configuration of the coins is chosen by the hangman, arbitrarily and unknown to you. Your goal is to have all four coins heads up. In each move you can select any subsets of the four coins, which are then flipped simultaneously by the hangman. After your move, if all four coins are heads up, you win. If not, the hangman may rotate the table by an amount of his choice (90, 180, 270, or 360 degrees). If you don't manage to have all four coins heads up in 20 moves or less, you lose and the hangman executes his job. What's your strategy?

Mandatory

M.1. Maximum flow and minimum cut Consider the network N below with capacities on the edges.

Give a maximum flow from s to t in the network N (write the flow for each edge), give the value of the flow, and give a minimum $s - t$ cut (give the partition of the vertices).



M.2. Modelling You are the president of in a country consisting of a group of X islands. The islands are connected with Y bridges. Not all pairs of islands are directly connected by a bridge, but it is possible to come from any island to every other island by traversing bridges and other islands. You want to know how well-connected your country is. So you want to know the minimum number of bridges that an enemy would have to destroy in order to disconnect your country. The country is disconnected if it is no longer possible to get from any island to every other island by traversing islands an bridges.

Give an algorithm to compute the minimum number of bridges that needs to be destroyed in order to disconnect the country. Analyze the running time of your algorithm in terms of X and Y .