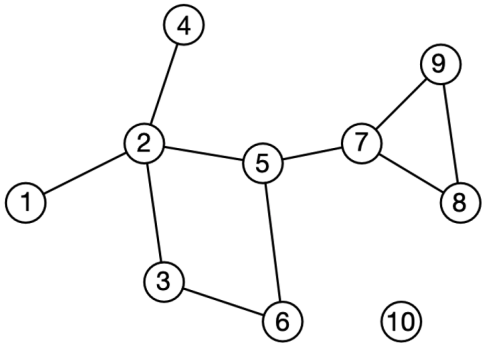
Exercise sheet 2 – Basic network properties

(1) Friendship network

Imagine that your social network has a subnetwork where 14 of your friends including you are all friends with each other. What is such a subnetwork called? How many edges are contained in this subnetwork? (2pts)

(2) Network quantites



(i) Write down the adjacency matrix and the edgelist. (2pts)

(ii) Draw the degree distribution by hand. (2pt)

(iii) Calculate the diameter, density and clustering coefficient per node and its average over the network. (4pts)

(iv)* Find the number of d=3 paths between 2 and 3. Which node pair has the most d=3 paths? (2pts)

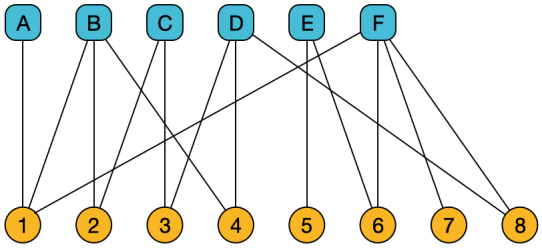
(1) Bipartite network

Consider a bipartite network with N1 and N2 nodes in the two sets.

(i) What is the maximum number of edges the network can have? (1pt)

(ii) Find an expression for how many edges cannot occur compared with a non-bipartite network of size N = N1 + N2 ? (2pts)

(iii)* Find the projections to both the yellow and the blue nodes for the bipartite network shown below. (3pts)



* You may use the support of a computer. If you do so please add a documented screenshot of your code. No need to upload an extra notebook.