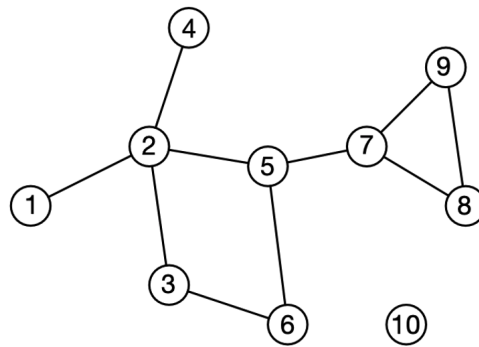


Exercise sheet 2 – Basic network properties

(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



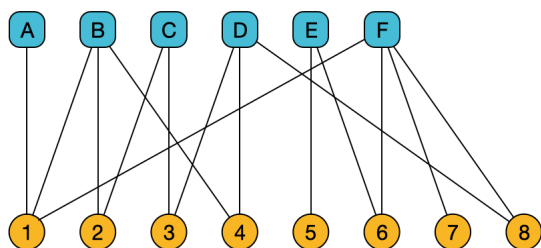
- (i) Write down the adjacency matrix and the edgelist. (2pts)
- (ii) Draw the degree distribution by hand. (2pt)
- (iii) Calculate the diameter, density and clustering coefficient per node and its average over the network. (4pts)
- (iv)* Find the number of $d=3$ paths between 2 and 3. Which node pair has the most $d=3$ paths? (2pts)

(1) Bipartite network

Consider a bipartite network with N_1 and N_2 nodes in the two sets.

- (i) What is the maximum number of edges the network can have? (1pt)
- (ii) Derive an expression for the number of edges that are prohibited in a bipartite network as compared to a non-bipartite network of size $N = N_1 + N_2$ (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.