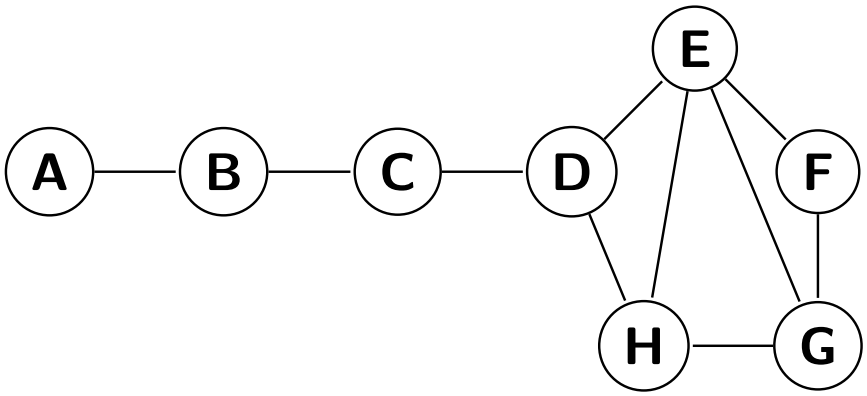
8 Machine Learning and Real-world Data (fm611)

Consider the following undirected graph:



(*a*) Define the following measures, and compute their values for nodes A, C, and H:

(*i*) Degree [1 mark]

(*ii*) Local Clustering Coefficient [2 marks]

(*iii*) Betweenness Centrality [2 marks]

(*b*) How could you measure the degree to which nodes form clusters or cliques within a network? [2 marks]

(*c*) Which measure would you use to find *connectors* in a social network. [2 marks]

(*d*) What is the diameter of the network depicted at the beginning of this question? [2 marks]

(*e*) Suppose that we delete the edge D-H and add an edge C-E to the network. How would this affect the Betweenness Centrality of nodes C, H, and E? [4 marks]

(*f*) What is a strongly connected directed graph? Is it possible to change the original graph into a directed graph by adding directionalities to the edges, so that the resulting graph is strongly connected? [3 marks]

(*g*) What algorithm could you use to break the original graph into connected clusters? Briefly describe how the algorithm works. [2 marks]