1. Apply Dijkstra’s algorithm to obtain the distance from vertex $a$ to each of the other vertices in the graph in Figure 1. Please show the list of “tentative distances” for each vertex in a tabular format.

2. Characterize when $K_{n_1,...,n_p}$ is Hamiltonian. Characterize when $K_{n_1,...,n_p}$ has a Hamiltonian path.

3. A drawing of the De Bruijn graph $D_4$ is given below in Figure 2. An independent set in a graph $G$ is a set of vertices no two of which are adjacent. The maximum size of an independent set in $D_4$ is 3. One such maximum size independent set is the set of vertices $\{000, 010, 111\}$. (There are other independent sets of size 3 as well.). Find the maximum size of an independent set in $D_5$. (You need not draw $D_5$ but you may find it helpful.)

4. A graph $G$ of order $n \geq 4$ has $deg(v) \geq (n + 1)/2$ for each vertex $v$ of $G$. Is $G - v$ Hamiltonian?
Figure 1: A graph, G
Figure 2: The DeBruijn graph $D_4$