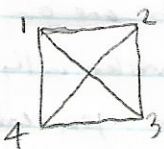
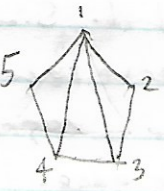

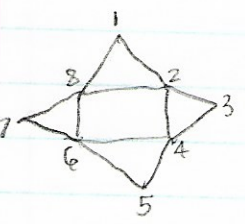


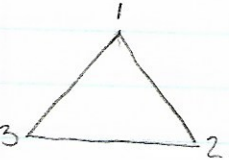
1.  $\begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix}$ This has neither a Eulerian path or a Eulerian cycle because each vertex has an odd number of edges.

 $\begin{pmatrix} 0 & 1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 & 0 \end{pmatrix}$ This has neither a Eulerian path nor a Eulerian cycle because two of the vertices have an odd number of edges.

2.  $\begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{pmatrix}$

 $\begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{pmatrix}$

3.  $\begin{pmatrix} 0 & 1 & 0 & 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 1 \\ 1 & 1 & 0 & 0 & 0 & 1 & 1 & 0 \end{pmatrix}$

 $\begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$

4. Assume that you have a Eulerian cycle. Choose any vertex. For each vertex, you must have $2k$ edges since for each time you cross by one edge to get to the vertex you must leave by another. Thus, each vertex must have an even number of edges.

5. For a Eulerian path, there are two vertices that have an odd degree, and you start and end with each one of odd degree. At the start of the cycle, you leave the vertex with one edge, and each time you return to that vertex you enter with a different edge and leave once again by a different edge. So, the degree of the starting vertex is $2k+1$. Similarly, the same is of the ending vertex. The other vertices have even degree since each time you use an edge to reach the vertex, you must leave by another edge.