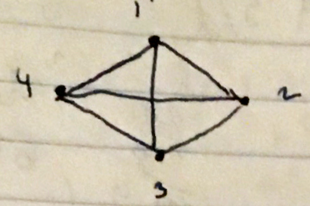
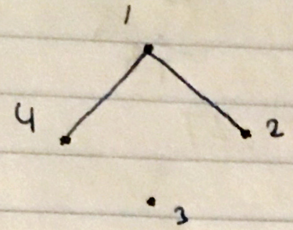
1.



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

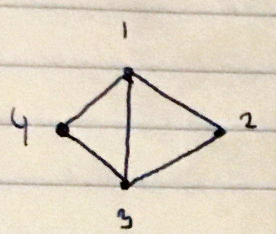
not possible:
Number of vertices with odd degree is neither 0 nor 2



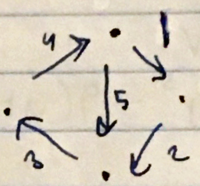
$$\begin{matrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{matrix}$$

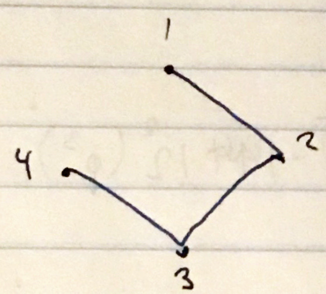
not possible:
not fully connected

2.

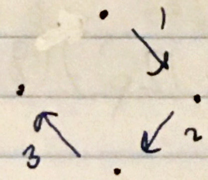


$$\begin{matrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{matrix}$$

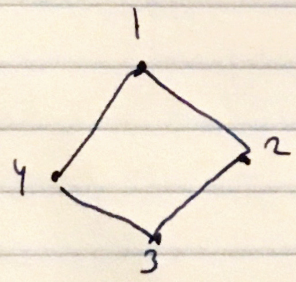




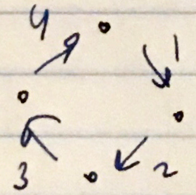
$$\begin{matrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{matrix}$$

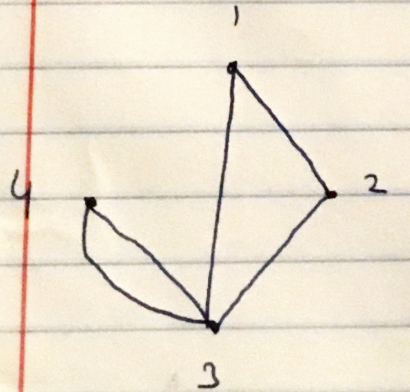


3.

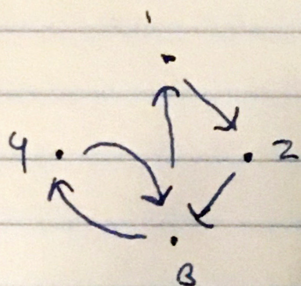


$$\begin{matrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{matrix}$$





$$\begin{matrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 2 \\ 0 & 0 & 0 & 2 \end{matrix}$$



4. Suppose a graph has a Eulerian cycle. Then the starting vertex is left ~~and not~~ at the beginning and entered at the end using unique edges, giving it degree two. The middle vertices are entered then left using unique edges, so if they were entered/left n times, ~~they mean~~ which by definition of Eulerian ~~path~~ cycle ~~has~~ enough to cover all their edges, they must have degree $2n$, which is even by definition. Even if the starting vertex is one of the middle vertices, where it's entered and left n times, its degree is $2(n+1)$, which is still even. So all vertices must have an even degree.

5. Suppose a graph has a Eulerian path. Then the starting vertex is left but not entered at the end, giving it degree one for all its edges to have been visited. Each middle vertex is entered and left n times, giving it degree $2n$ which is even. The ending vertex is finally entered but never left giving it degree one. Even if the starting and/or ending vertices are middle vertices that are ~~lef~~ entered/left n times, their degree is $2n+1$ which is still odd. So all vertices except the starting and ending ones have an even degree, while the starting and ending ones have an odd degree.