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Math 525
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1. B

2. Consider a graph $G = (V, E)$ where $V = \{v_1, v_2, ..., v_n\}$. Without loss of generality, select vertex v_1 and assume that there is an edge between v_1 and $v_2, ..., v_b$. Make each of these edges directed towards v_1. Order the set of vertices pointing towards v_1 and select the first (without loss of generality we name this v_2). Make each undirected edge connected to v_2 a directed edge directed towards v_2. Repeat this process for each vertex in the set of vertices pointing towards v_1.

Now select v_2 and consider all the vertices connect to v_2. Order the set of vertices pointing towards v_2 and select the first. Repeat the process describe for this vertex as the one used for the set of vertices connected to v_2. Repeat for all vertices connected to v_2. Then consider the vertices connected to v_3 and select the first, and repeat the process described. Repeat for all vertices connected to v_1.

Consider a graph $G = (V, E)$ where $V = \{v_1, v_2, ..., v_n\}$. Without loss of generality, select vertex v_1 and assume that there is an edge between v_1 and $v_2, ..., v_b$. Make each of these edges directed towards v_1. Now consider the set of all vertices which have at least one directed edge and order them. Order these vertices and select the first. Make every undirected edge connected to this vertex a directed edge pointed towards the vertex in question. Repeat for all vertices in the order set. Once all vertices have been considered, consider the new set of all vertices which have at least one directed edge and order them. Repeat the process on this set until all vertices in the set have been considered. Continue creating this set and directing edges until all edges have been directed. In the case that the graph has disconnected components, perform this process on each component.

This algorithm will create a directed graph with no directed cycles.

3.

1. Undirected, cyclic
2. Directed, cyclic,