In-class Problems - Rachna Sha
17.1

1. Prove that any finite DAG has at least one vertex with in-degree 0.

   Proof:

   Suppose a DAG contains no vertex with in-degree 0. This implies that each of the vertices have an in-degree count of at least 1. Consider a DAG G, with a set of three vertices (1,2,3) as shown below - where each vertex has a in-degree count of 1.

   The Graph 'G' has a walk that starts at vertex 1 and finishes at 1, with no other repeated vertices. This walk is a cycle. This contradicts that fact that 'G' is a DAG.

   This proves (by contradiction) that a DAG must have at least one vertex with in-degree 0.

   G :