8.14.32

A tournament is a digraph in which there is exactly one edge between every two vertices.

**A. How many edges does a tournament have?**

A tournament has (n! / (2! (n – 2)!)) or (N2) number of edges. As the number of vertices increase, the number of edges increases almost exponentially.

**B. How many different tournaments of n edges can be created?**

Every tournament of N vertices contains a sub-tournament on 1 + [log2N] vertices. My guess would be that N2 tournaments can be created from n different edges, given that changing the direction of a single directed edge creates an entirely new tournament.

**C. Can each tournament be topologically sorted?**

No, with some tournaments there is not a distinct winner. This means that the tournament will be considered a cyclic digraph, which disqualifies it from being topologically sorted.

**D. How many minimal vertices can a tournament have?**

A tournament can have at most V / 2 minimal vertices, in the case that half of the vertices have an equivalent number of losses.

**E. A transitive tournament is a tournament that has edge(vw) if it has edge(vu) and edge(uw). Can such a tournament have a cycle?**

No a transitive tournament must be acyclic. Given the equivalent statements T is transitive and T is acyclic.