Math 234

Graph Theory Day 26

1. In each case below, either draw a graph with the stated criteria or explain why no such graph exists.

   (a) Five edges and total degree twelve

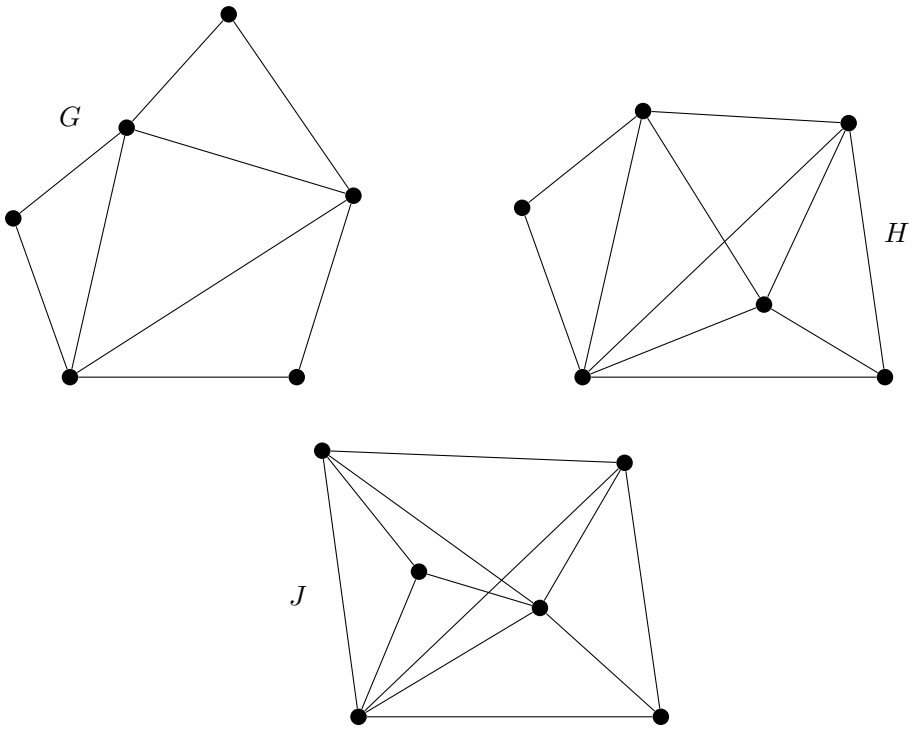
   (b) Five edges and total degree ten

   (c) Five vertices and total degree twelve

2. Each graph below represents a set of islands (vertices) connected by bridges (edges). In each case determine:

   (a) Is there a walking tour that traverses each bridge exactly once?

   (b) Is there a walking tour that traverses each bridge exactly once, and that also returns to the starting island?



What criteria guarantees that a walking tour exists as described in (a) or (b)? Make a conjecture.

3. Show that, in any gathering of six people, there are either (a) three people who all know each other or (b) three people none of whom knows the other two. *Hint*: Use a graph where vertices represent people and edges connect people who know each other.

4. How large of a group is required to guarantee that the group contains either (a) four people who all know each other or (b) three people none of whom knows the other two.