Study Guide #3

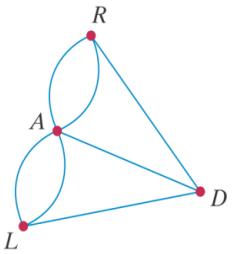
This part covers the chapter "The Mathematics of Getting Around" from the book. You should be able to represent a situation (map with bridges) as a graph and to decide:

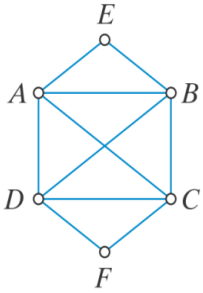
- if a certain graph is possible to draw,
- if an Euler path or circuit is possible in a given graph
- if an Euler path or circuit is not possible, how to "Eulerize" it.

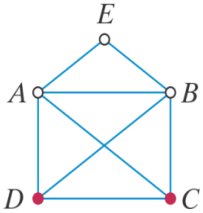
You should be able to explain your answers by referring to the three theorems we discussed in class.

Examples:

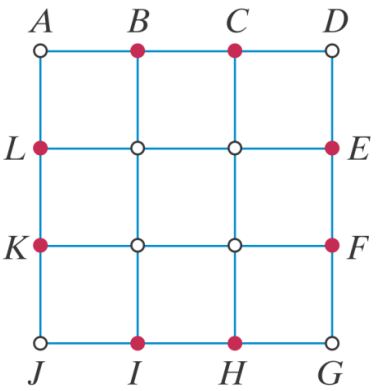
1. Draw a graph with exactly 6 odd vertices. Draw a graph with all even vertices. Draw a graph with 3 odd vertices. Draw a graph with all odd vertices. If it is not possible, explain why.
2. Look at the following graphs and decide if Euler path or Euler circuit (or both) is possible.

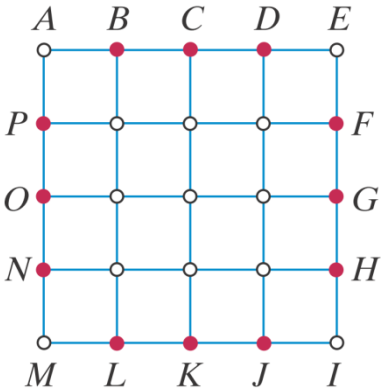






3. If Euler path is not possible in the graphs above, what is the easiest way to make it possible (several correct solutions). Explain.
4. If Euler circuit is not possible in the graphs above, what is the easiest way to make it possible (several correct solutions). Explain.
5. Street-routing problems. Pick a vertex "inside" the square. Find the most efficient way to walk along each street at least once and return to your starting position. How many streets do you need to walk twice? Is it the smallest number possible?





Other examples from the book: #19, 20, 21 (Kingsburg, Royalton, Green Hills. Draw them as graphs and find the most efficient parade route), #35, 36, 37, 38 (finding Euler Circuits and Paths in the given graphs), #43 (finding optimal Eulerization of a given graph).