

Math 210, Fall 2015, Collected Homework Assignment #9 – due Tuesday, Dec. 8

Write all work and answers on a separate sheet(s) of paper. **For full credit, indicate how you came up with your answers** – that is, show your work and/or provide explanation where appropriate.

For the following, let  $G$  be a non-directed graph with the following adjacency matrix:

$$\begin{bmatrix} 1 & 0 & 1 & 0 & 1 & 2 \\ 0 & 0 & 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 1 & 0 & 2 \\ 1 & 0 & 0 & 0 & 0 & 1 \\ 2 & 1 & 0 & 2 & 1 & 0 \end{bmatrix}$$

1. Explain how you can tell, even before you draw a diagram, that  $G$  has an Euler cycle. (You may assume that  $G$  is connected in your explanation; that's hard to infer from the matrix.)
2. Draw a diagram for  $G$ . (Note: choose your own names for the vertices, and arrange them however you like. Then fill in the edges of  $G$  according to the adjacency matrix.)
3. Find an Euler cycle for  $G$ . Write your answer by listing the vertices of your cycle in order (similarly to the examples in the book and in class).
4. Does  $G$  have a Hamiltonian cycle? If so, find one, and list its vertices in order. Or, if you think there isn't one, say that none exists, and explain how you arrived at that conclusion.