MATH 3411 (Ng/Fall 2011)
Handout 7
Constructing Euler tours in eulerian graphs.
for class on November 15, 2011.

Algorithm for Constructing Euler Tours

Input: An *eulerian* graph $G = (V, E)$, i.e. G is connected and $\forall v \in V, d_G(v)$ is even.
Output: An euler tour in G.

Step 1 Choose any starting vertex.

Step 2 Begin tracing a trail randomly from the starting vertex until you get stuck, i.e. cannot continue to do so without repeating an edge. (By Theorem, you should get stuck at the starting vertex).

Step 3 If the trail covers all edges in G then we are done. STOP. Otherwise, name this trail an *approximate Euler tour* and go to Step 4.

Step 4 Choose a new starting vertex which is on the approximate Euler tour generated so far, and which also has at least one unused edge incident to it.

Step 5 Begin tracing a trail randomly from the starting vertex, avoiding edges already on the current *approximate Euler tour* generated so far. Continue until you get stuck, i.e. cannot do so without repeating an edge. (By Theorem, you should get stuck at the vertex you started out with in Step 4).

Step 6 Create a *new approximate Euler tour* by taking the *current approximate Euler tour* and concatenate with the trail obtained from Step 5, in the following way:

(a) Trace the current approximate Euler tour till you get to the starting vertex of Step 5.

(b) Follow through with the trail just obtained in Step 5, returning to its starting vertex.

(c) Finish tracing the current approximate Euler tour.

Step 7 If this *new approximate Euler tour* is an Euler tour of G then STOP. Otherwise, name this trail the *current approximate Euler tour* and repeat Step 5.