Math 13 – Homework #1 (Due Tuesday) Name_____

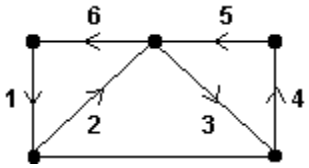
Write all responses on separate paper. Use complete sentences to explain your answers and draw diagrams, as necessary to aid in explanation. Show your work for credit.

1. On a graph that represents six cities and the roads between them, the valence of vertex A is 4. What does this mean in real world terms?

2. Draw a graph representing four cities A, B, C, and D with a road that connects each pair of cities given: AB, AC, BC, BD, CD.

3. Draw a graph with vertices A, B, C, and D in which the valence of vertices A and D is 3 and the valence of vertices B and C is 2.

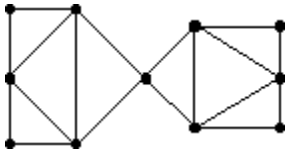
4. Consider the path represented by the sequence of numbered edges on the graph below. Explain why the path is *not* an Euler circuit.



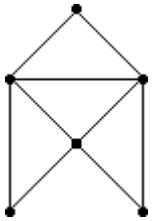
5. Draw a graph with 8 vertices, with the valence of each vertex even, that does *not* have an Euler circuit.

6. Draw an Euler circuit for each of the graphs below

a.

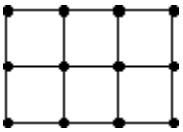


b.

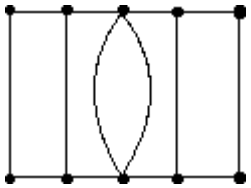


7. Add wiggly edges to find an efficient Eulerization of the graphs shown below.

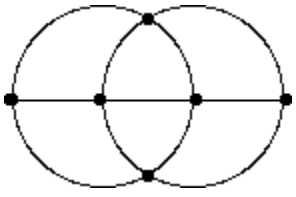
a.



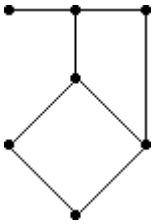
b.



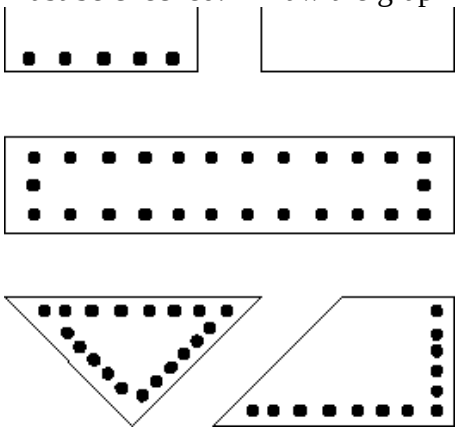
c.



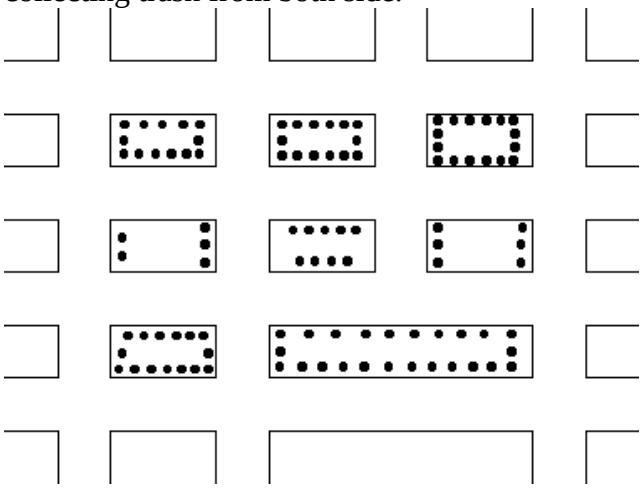
d.



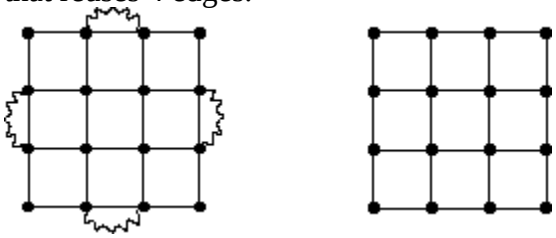
8. The map below gives the territory of a parking control officer. The dots represent meters that must be checked. Draw the graph that would be useful for finding an efficient route.



9. For the street network shown below, draw a graph that would be useful for routing a garbage truck. Assume all streets are two way and that passing once down the street is sufficient for collecting trash from both side.



10. Find an Euler circuit on the graph on the left and use it to find a circuit on the graph on the right that reuses 4 edges.



11. Draw a graph with 6 vertices where the valences are 1, 2, 2, 3, 4, and 4.

12. Find an eulerization with 9 added edges for a 3-by-6 block rectangular street network

13. Draw a graph where every vertex has a valence of at least 2, but removing a single edge disconnects the graph.