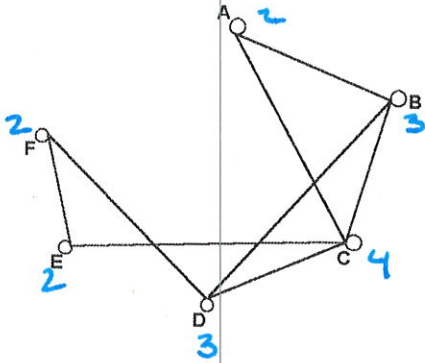
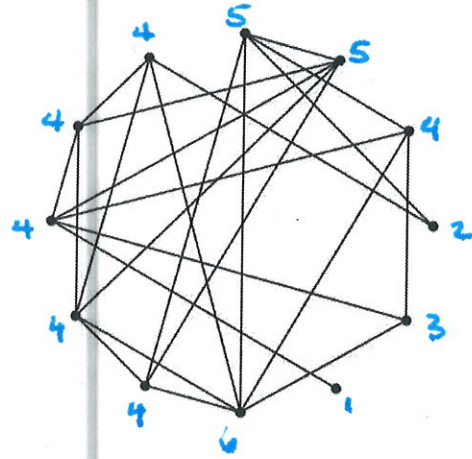


Instructions: Show all work. Use exact answers unless specifically asked to round. Be sure to complete all parts of each problem.

- Determine which, if either, of the following graphs contain an Euler circuit, an Euler path, or neither. Explain your choice. (5 points each)

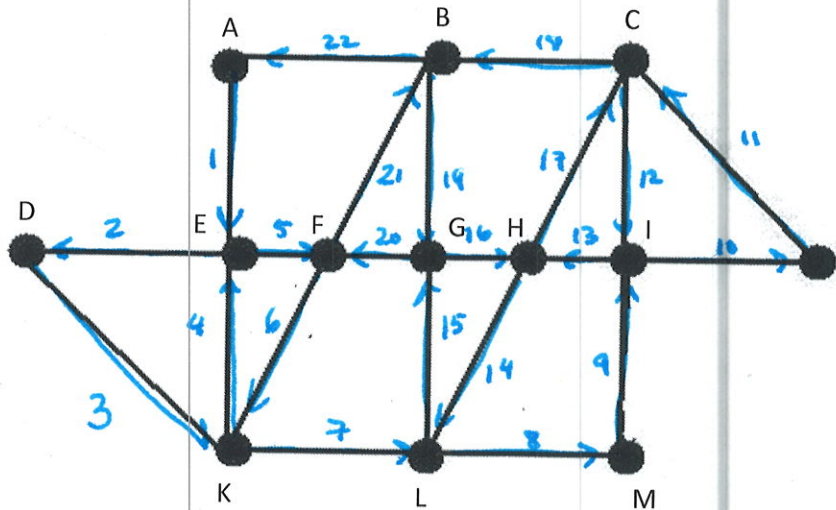


*Contains an Euler path
2 odd vertices*



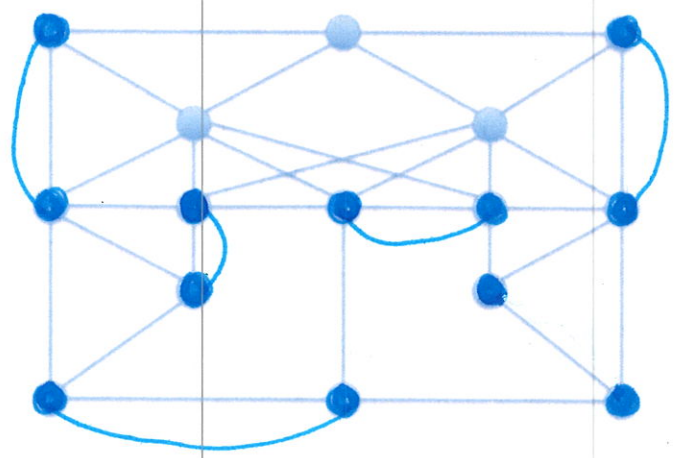
*none
4 odd vertices*

- Use Fleury's Algorithm on the graph below to find an Euler circuit (or path). List the vertices you travel through in order, or number the edges as you use them. (8 points)



answers will vary

3. Semi-Eulerize the graph below. What is the minimum number of edges that might be used to semi-Eulerize this graph, and how many did you actually use? (8 points)

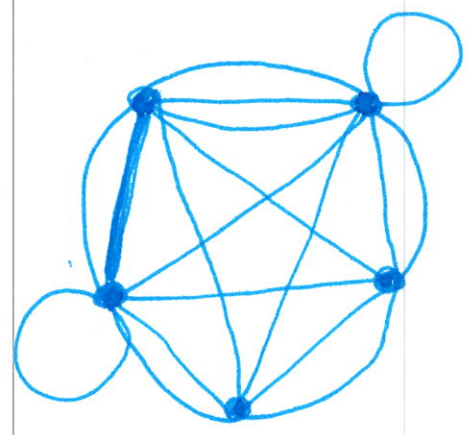


answers will vary

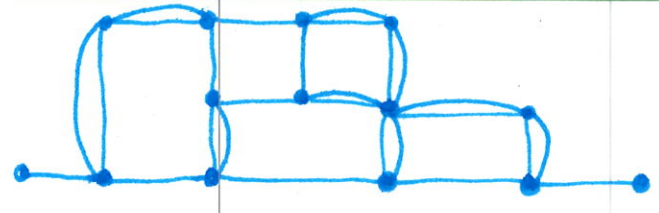
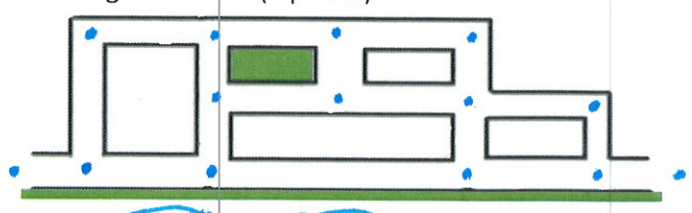
12 vertices
 minimum 6 are needed
 to Eulerize
 5 to semi Eulerize

I actually used 5

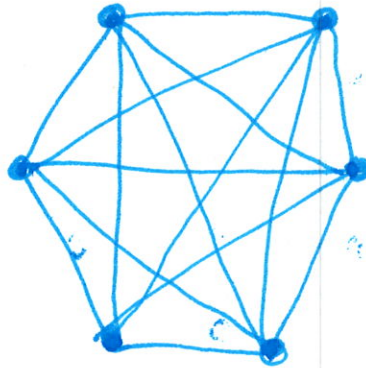
4. Draw a graph with 7 vertices, 18 edges (including two loops). (6 points)



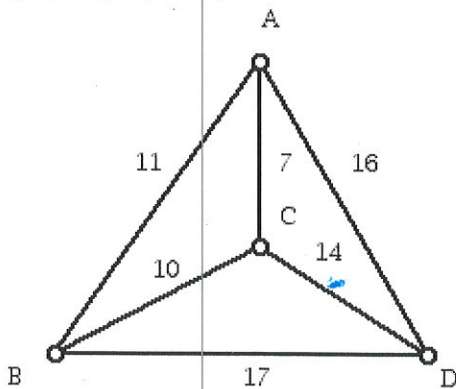
5. The graph below represents a small neighborhood. Canvasers are planning to go door-to-door to pass our flyers for the school board candidate they support. Assuming that houses line both sides of the street, except where shaded in green, and that they intend to start at the left edge of the graph, and finish on the right edge where their ride will pick them up. Construct a map of the neighborhood. (7 points)



6. Draw the K_6 graph. (6 points)



7. Find the highest value Hamilton circuit by Brute Force. Be sure to state the weight of the final graph. (10 points)

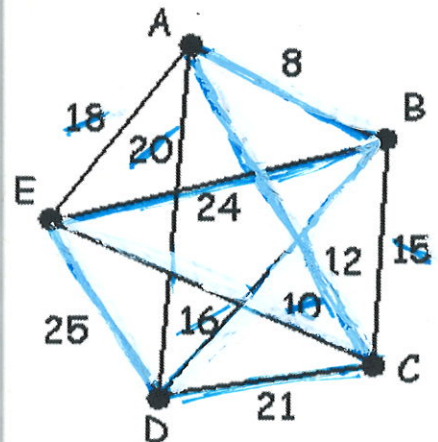


$$\begin{aligned} ABCDA &= 11 + 10 + 14 + 16 = 51 \\ ABDCA &= 11 + 17 + 14 + 7 = 49 \leftarrow \\ ACBDA &= 7 + 10 + 17 + 16 = 50 \end{aligned}$$

highest cost circuit is
ABCDA at 51.

8. Use the graph to the right to answer the following questions. Clearly state the final weight of your circuit.
a. Find the (approx.) lowest cost Hamilton circuit by the Nearest Neighbor Algorithm, starting at C. (10 points)

$$\begin{aligned} CEABDC \\ 10 + 18 + 8 + 16 + 21 = 73 \end{aligned}$$



b. Find the (approx.) maximum cost Hamilton circuit by the "Cheapest Link" Algorithm (in this case, the "Most Expensive Link"). (10 points)

$$25 + 24 + 21 + 12 + 8 = 90$$

ABEDCA

9. Use the Nearest Neighbor Algorithm to find the (approx.) lowest cost Hamilton circuit using the table below. What is the length of the final circuit? (10 points)

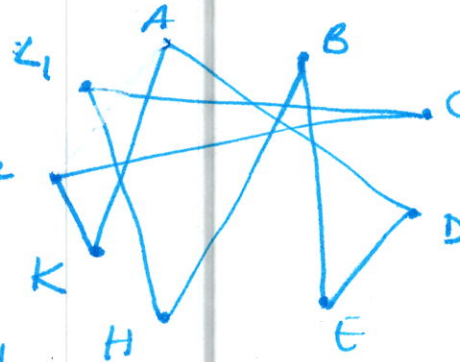
Aberdeen	Bristol	Cambridge	Dover	Exeter	Hereford	Kendal	Leeds	Lincoln
613	171	124	244	128	204	177	142	
473	206	250	244	310	204	72		
595	83	153	224	294	188			
587	54	252	355	294	188			
482	236	147	272	250	153			
279	219	94	219	250	153			
328	185							
288								

Distance in kilometres

Starting in Aberdeen

A K L C L i H B E D A

$$279 + 72 + 147 + 94 + 153 + 54 + 83 + 244 + 595 = 1721$$



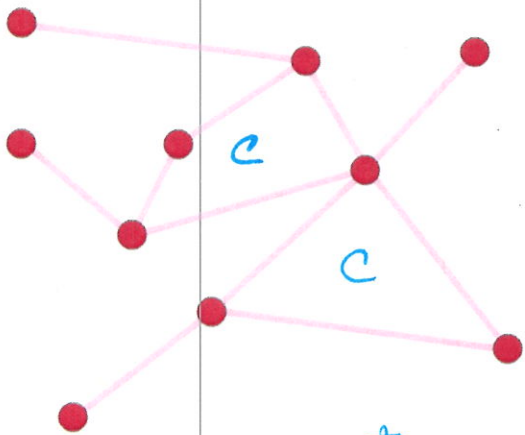
10. Which of the following algorithms are optimal? Circle all that apply. (3 points)

- a. Brute Force
- b. Cheapest Link
- c. Nearest Neighbor
- d. Kruskal's
- e. Repeated Nearest Neighbor

11. Which of the following algorithms are efficient? Circle all that apply. (3 points)

- c. Brute Force
- d. Cheapest Link
- e. Repeated Nearest Neighbor
- f. Kruskal's

12. Find the redundancy of the graph below. (5 points)



10 vertices
 11 edges
 redundancy is 2
 tree needs 9 edges for 10 vertices
 $11 - 9 = 2$
 There are 2 circuits