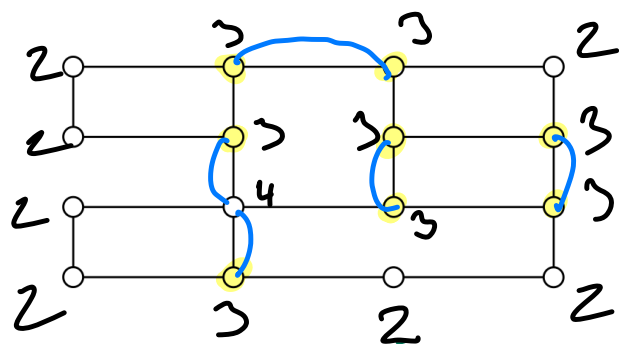


- The following exercises must be completed as a group and turned in at the end of class. Everyone has to write the answers and turn in their quiz. I will randomly select one of the quizzes to grade, and everyone in the group gets the same grade.

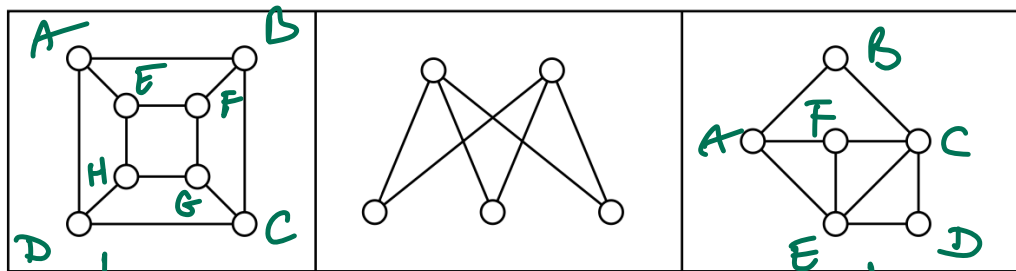
1. What is the minimum amount of edges that need to be added to Eulerize this graph? Show the added edges on the graph below.



highlighted vertices
need to be fixed
(to have even degree)

5 minimum edges

2. Does each of these graphs have at least one Hamiltonian circuit? If so, write down one Hamiltonian circuit as a list of vertices.



yes

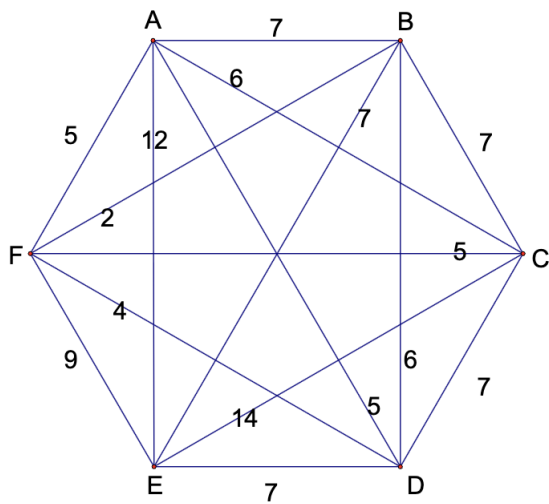
no

yes

A B C D E F A

A E H D C G F B A

3. A florist needs to make 5 deliveries around town. The weighted graph below gives the miles from place to place. His shop is located at vertex A.



- I) How many Hamilton circuits would you need to check if you were to do this problem by the Brute Force Algorithm? (Don't do it by the way!)

Answer: 6 vertices so $(6-1)! = 5! = 120$ circuits

- II) Find the Hamilton circuit obtained by using the **Repetitive Nearest Neighbor Algorithm**.

- (a) Circuit starting at vertex A: $A \rightarrow F \rightarrow B \rightarrow D \rightarrow C \rightarrow E \rightarrow A$: $5 + 2 + 6 + 7 + 14 + 12 = 46$
- (b) Circuit starting at vertex B: $B \rightarrow F \rightarrow D \rightarrow A \rightarrow C \rightarrow E \rightarrow B$: 38 !
- (c) Circuit starting at vertex C: $C \rightarrow F \rightarrow B \rightarrow D \rightarrow A \rightarrow E \rightarrow C$: 44
- (d) Circuit starting at vertex D: $D \rightarrow F \rightarrow B \rightarrow A \rightarrow C \rightarrow E \rightarrow D$: 40
- (e) Circuit starting at vertex E: $E \rightarrow B \rightarrow F \rightarrow D \rightarrow A \rightarrow C \rightarrow E$: 38 !
- (f) Circuit starting at vertex F: $F \rightarrow B \rightarrow D \rightarrow A \rightarrow C \rightarrow E \rightarrow F$: 42
- (g) **Optimal circuit** rewritten as starting at vertex A (at the florist shop):

optimal is starting at B or E
 $B \rightarrow F \rightarrow D \rightarrow A \rightarrow C \rightarrow E \rightarrow B \rightarrow$ $\rightarrow$ rewritten: $A \rightarrow C \rightarrow E \rightarrow B \rightarrow F \rightarrow D \rightarrow A$