CS 173, Fall 2014
Examlet 6, Part B

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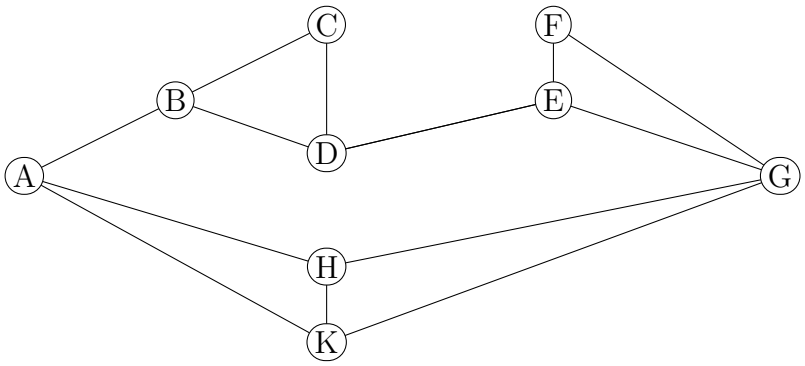
Discussion: Thursday 2 3 4 5 Friday 9 10 11 12 1 2



1. (8 points) Recall that a path never re-uses a node. How many paths are there from A to G in the above graph? Explain or show work.

   Solution: There are 4 paths via H and/or K: AHG, AKG, AHKG, AKHG.

   If the path goes via B, D, and E, you can optionally go via C and/or optionally go via F. So there are four paths via that half.

   In total, there are $4 + 4 = 8$ paths.

2. (3 points) What is the diameter of the above graph?

   Solution: 3

3. (4 points) What's the difference between an open walk and a closed walk?

   Solution: A closed walk starts and ends at the same node. The start and end of an open walk are different nodes.

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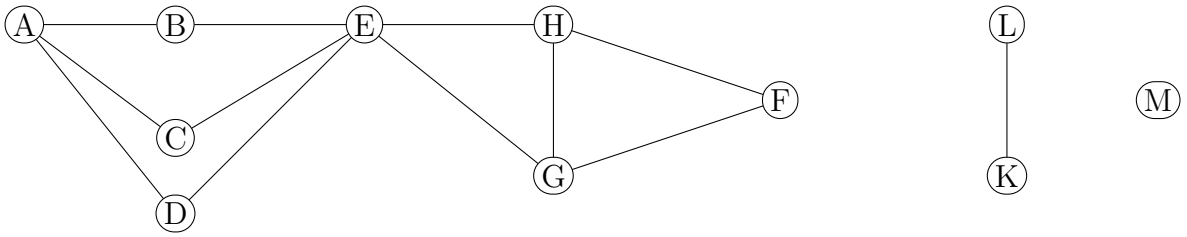

1. (8 points) Recall that a path never re-uses a node. How many paths are there from A to F in the above graph? Explain or show work.

   Solution: There are three paths from A to E. From E to F, there are four paths (EHF, EGF, EGHF, EHGF). So there are $3\dot{4} = 12$ paths total.

2. (3 points) How many connected components does the above graph have?

   Solution: 3

3. (4 points) Does this graph have an Euler circuit? Briefly justify your answer.

   Solution: No, it doesn't have an Euler circuit. Some of the nodes (e.g. A) have odd degree. Also, the graph isn't connected.

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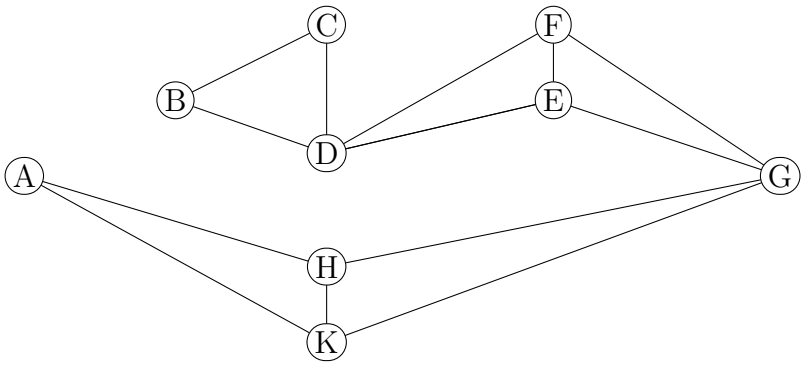

1. (8 points) Recall that a path never re-uses a node. How many paths are there from A to B in the above graph? Explain or show work.

   Solution: There are four paths from A to G (AHG, AKG, AHKG, AKHG). Similarly, there are four paths from G to D. Finally, there are two paths from D to B. So there are $4 \cdot 4 \cdot 2 = 32$ paths total.

2. (3 points) What is the diameter of the above graph?

   Solution: 5

3. (4 points) What is the difference between a cycle and a closed walk?

   Solution: Except that the starting and ending nodes are the same, a cycle doesn't contain any repeated nodes. Also, a cycle needs to contain at least three nodes. A closed walk has neither of these restrictions.

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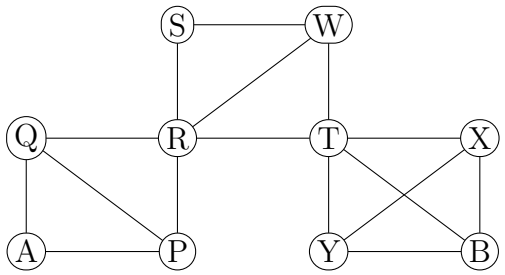

1. (8 points) Recall that a path never re-uses a node. How many paths are there from A to B in the above graph? Explain or show work.

   Solution: There are four paths from A to R (APR, AQR, APQR, AQPR). There are three paths from R to T (RT, RSWT, RWT). Finally, there are five paths from T to B (TB, TXB, TXYB, TYB, TYXB). So, in total, there are $4 \cdot 3 \cdot 5 = 60$ paths from A to B.

2. (3 points) How many connected components does the above graph have?

   Solution: One.

3. (4 points) Is the cycle graph C_{17} a subgraph of the wheel graph W_{23}? Briefly justify your answer.

   Solution: Yes, it is. Match 16 of the nodes in C_{17} with consecutive nodes on the rim of W_{23}. Then match the last node of C_{17} with the hub node of W_{23}.