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*CS-225: Discrete Structures in CS*
*Homework Assignment 9, Part 2*
*Exercise Set 10.2: Question # 2, 9.b, 13, 20, 21*

- **Set 10.1 – Q#2**

**a. walk**

Because it starts at $v_1$ and ends at $v_0$, and it has repeated vertices $v_1$ and $v_2$, and a repeated edge $e_2$.

**b. simple circuit**

Because it starts and ends at the same vertex $v_2$, contains at least one edge, does not contain a repeated edge, and does not have any other repeated vertex except the first and last.

**c. closed walk**

Because it has repeated vertices $v_2$ and $v_4$, and a repeated edge $e_5$, and it starts and ends at the same vertex $v_4$.

**d. circuit**

Because it contains at least one edge, does not contain a repeated edge, and it starts and ends at the same vertex $v_2$, but the vertex $v_2$ also appears at middle of the walk.

**e. trail**

Because it starts at $v_0$ and ends at $v_1$, contains a repeated vertex $v_2$, and it does not contain a repeated edge.

**f. path**

Because it starts at $v_5$ and ends at $v_1$, and it does not contain a repeated edge or a repeated vertex.

- **Set 10.1 – Q#9.b**

Yes. Because graph G is connected and the degree of every vertex of G is a positive even integer, so G has an Euler circuit.

- **Set 10.1 – Q#13**

This graph does not have an Euler circuit. Because the degree of vertex $v_1$ is 5, degree of vertex $v_7$ is 3, degree of vertex $v_8$ is 3, and degree of vertex $v_9$ is 3, which are all odd degree, whereas all vertices of a graph with an Euler circuit have even degree. So the graph does not have an Euler circuit.

- **Set 10.1 – Q#20**

For this graph, there is no Euler Path from u to w. Because the degree of vertices e and h are 3, both odd, which indicates that not all the vertices of this graph except v and w have positive even degree. So there is no Euler Path from u to w.

- **Set 10.1 – Q#21**

For this graph, there is an Euler path from u to w. Because this graph is connected, u and w have odd degree [deg(u)=3 and deg(w)=3], and all other vertices have positive even degree [deg($v_0$)=2, deg($v_1$)=2, deg($v_2$)=2, deg($v_3$)=4, deg($v_4$)=4, deg($v_5$)=2, deg($v_6$)=4, deg($v_7$)=2].

One Euler path is u$v_0v_7v_6v_3$u$v_1v_2v_3v_4v_6$w$v_4v_5$w.