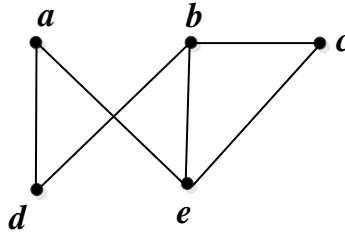


Exercise

Does each of these lists of vertices form a path in the following graph? Which paths are simple? Which are circuits? Which are the lengths of those that are paths?



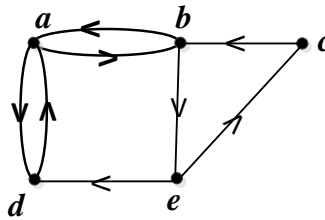
- a) a, e, b, c, b b) a, e, a, d, b, c, a c) e, b, a, d, b, e d) c, b, d, a, e, c

Solution

- a) This is a path of length 4, but it is not a circuit, since it ends at a vertex other than the one at which it began. It is not a simple, since it uses an edge more than once.
 b) This is not a path, since there is no edge from c to a .
 c) This is not a path, since there is no edge from b to a .
 d) This is a path of length 5, which is a circuit. It is simple, since no edges are repeated.

Exercise

Does each of these lists of vertices form a path in the following graph? Which paths are simple? Which are circuits? Which are the lengths of those that are paths?



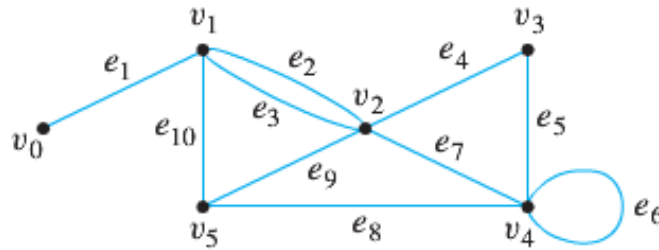
- a) a, b, e, c, b b) a, d, a, d, a c) a, d, b, e, a d) a, b, e, c, b, d, a

Solution

- e) This is a path of length 4, but it is not a circuit, since it ends at a vertex other than the one at which it began. It is simple, since no edges are repeated.
 f) This is a path of length 4, which is a circuit. It is not simple, since it uses an edge more than once.
 g) This is not a path, since there is no edge from d to b .
 h) This is not a path, since there is no edge from b to d .

Exercise

Determine whether of the following walks are trails, paths, circuits, or simple circuits or just walk to the graph below.



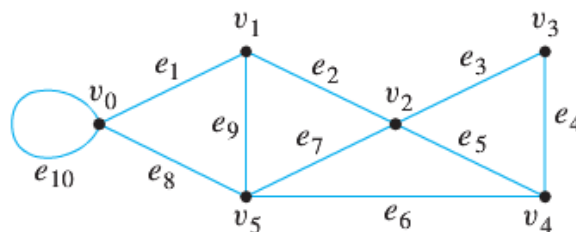
- a) $v_0 e_1 v_1 e_{10} v_5 e_9 v_2 e_2 v_1$ b) $v_4 e_7 v_2 e_9 v_5 e_{10} v_1 e_3 v_2 e_9 v_5$ c) v_2
d) $v_5 v_2 v_3 v_4 v_4 v_5$ e) $v_2 v_3 v_4 v_5 v_2 v_4 v_3 v_2$ f) $e_5 e_8 e_{10} e_3$

Solution

- a) It is trail since no repeated edge. It is not a path, repeated vertex v_1 , it is not a circuit, since it ends at a vertex other than the one at which it began v_0 .
- b) It is a walk, it is not a trail since it has a repeated edge e_9 . It is not a circuit, since it ends at a vertex other than the one at which it began v_4 .
- c) It is a closed walk, starts and ends at the same vertex v_2 . It is a trail since no repeated edge. It is not a path or a circuit, since no edge.
- d) It is a path and it is circuit but not a simple circuit since it has a repeated vertex v_4 .
- e) It is a closed walk, starts and ends at the same vertex v_2 . It is not a trail since it has repeated edges $\{v_2, v_3\}$ & $\{v_3, v_4\}$.
- f) It is a path, it is not a circuit, since it ends at a vertex other than the one at which it began.

Exercise

Determine whether of the following walks are trails, paths, circuits, or simple circuits or just walk to the graph below.



- a) $v_1 e_2 v_2 e_3 v_3 e_4 v_4 e_5 v_2 e_2 v_1 e_1 v_0$ b) $v_2 v_3 v_4 v_5 v_2$ c) $v_4 v_2 v_3 v_4 v_5 v_2 v_4$
d) $v_2 v_1 v_5 v_2 v_3 v_4 v_2$ e) $v_0 v_5 v_2 v_3 v_4 v_2 v_1$ f) $v_5 v_4 v_2 v_1$

Solution

- a)* It is not a trail since it has a repeated edge e_2 . It is not a path, repeated vertex v_1 , it is not a circuit, since it ends at a vertex other than the one at which it began v_1
- b)* It is a closed walk, starts and ends at the same vertex v_2 . It is a trail since no repeated edge. It is a circuit.
- c)* It is not a trail since it has repeated edges $\{v_2, v_4\}$. It is a circuit, but not a simple circuit.
- d)* It is a path and it is circuit but not a simple circuit since it has a repeated vertex v_2
- e)* It is a trail since no repeated edge. It is not a circuit, since it ends at a vertex other than the one at which it began.
- f)* It is a path, it is not a circuit, since it ends at a vertex other than the one at which it began.