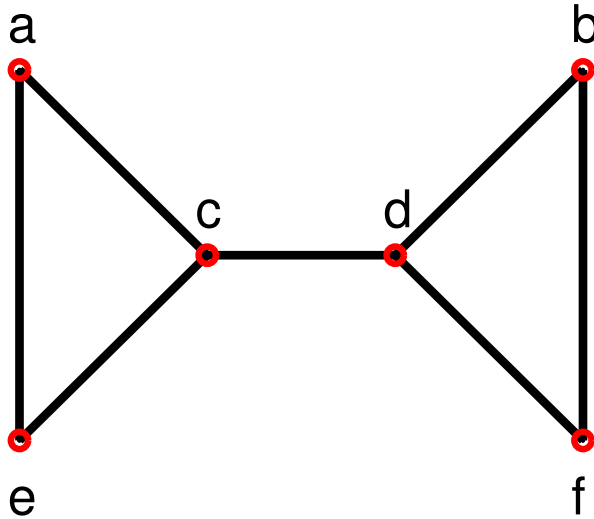


**Quiz #18**  
**SOLUTIONS**

1. { 4 points } Determine whether the given graph has an Euler circuit. Construct such a circuit when one exists. If no Euler circuit exists, determine whether the graph has an Euler path and construct such a path, if one exists.



There is no Euler circuit since there is a vertex with odd degree ( $\deg(c) = 3$  and  $\deg(d) = 3$ ). The following is an example of an Euler path

$$c, a, e, c, d, b, f, d$$

2. { 4 points } Same as above but for a Hamilton circuit and a Hamilton path.

There is no Hamilton circuit. (Simple explanation: A Hamilton circuit cannot return after passing through the edge  $\{c, d\}$ . Formal explanation: A Hamilton circuit should contain all the edges adjacent to vertices of degree 2. That are all edges but  $\{c, d\}$ . Since all the vertices of the received subgraph have degree 2, we cannot add any more edges. However, the subgraph is not connected, so no Hamilton circuit exists.) The following is an example of a Hamilton path

$$a, e, c, d, b, f$$

3. { 2 points } How many vertices does a full binary tree with 30 internal vertices have?

$$30(2) + 1 = 61$$