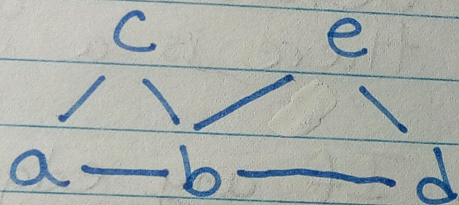Note: $\langle v \rangle$ is NOT a cycle.

E.g. Consider the graph below.

1. $\langle b, c, a, b \rangle$ is a simple cycle of length 3.

2. $\langle b, c, a, b, d, e, b \rangle$ is not a simple cycle.

3. $\langle b, d, b \rangle$ is not a cycle because it uses $\{b, d\}$ twice.