A graph $G(V, E)$ with non-empty sets $V$ and $E$ has a weight function $w$, and no negative cycles. The following statements were made about such a graph.

1. There is at least one pair of vertices, $v_i \in V$ and $v_j \in V$, such that the shortest path from $v_i$ to $v_j$ consists of the single edge $(v_i, v_j) \in E$.
2. For every edge $(v_i, v_j) \in E$, the shortest path from $v_i$ to $v_j$ consists of the single edge $(v_i, v_j)$.

For every one of the statements, circle whether it is correct or incorrect. If you marked that it is correct, explain your answer. If you marked that it is incorrect, show a counter-example to the statement.

Statement 1: correct incorrect

Explanation or counter-example:

Consider two arbitrary vertices $v_a \in V$ and $v_b \in V$ that are connected by a path. Let the shortest path between them be $< v_a = v_k, v_{k+1}, \ldots, v_b = v_{k+d} >$, where $d \geq 1$. It is known that every subpath of a shortest path is a shortest path between its two endpoints. Therefore, the edge $< v_k, v_{k+1} >$ is a shortest path between $v_k$ and $v_{k+1}$.

Statement 2: correct incorrect

Explanation or counter-example:

The shortest path from A to B is $<A, C, B>$ and not $<A, B>$. 
A graph $G(V, E)$ with non-empty sets $V$ and $E$ has a weight function $w$, and no negative cycles. The following statements were made about such a graph.

1. For every edge $(v_i, v_j) \in E$, the shortest path from $v_i$ to $v_j$ consists of the single edge $(v_i, v_j)$.
2. There is at least one pair of vertices, $v_i \in V$ and $v_j \in V$, such that the shortest path from $v_i$ to $v_j$ consists of the single edge $(v_i, v_j) \in E$.

For every one of the statements, circle whether it is correct or incorrect. If you marked that it is correct, explain your answer. If you marked that it is incorrect, show a counter-example to the statement.

Statement 1: correct incorrect

Explanation or counter-example:

Statement 2: correct incorrect

Explanation or counter-example: