Mutual Exclusion and independence

Two of these statements are true, one is false. Explain to each other which ones are true, and find a counter-example to the false one.

1. If $A, B$ both have nonzero probability and they are mutually exclusive, then they cannot be independent.

2. If $A$ has zero probability, then $A, B$ are independent (for any $B$).

3. If two events are independent, then at least one has nonzero probability.

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