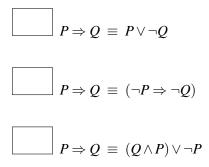
CS 70 Discrete Mathematics and Probability Theory Fall 2019 Alistair Sinclair and Yun Song Quiz 1

1. [True or False?] Mark each of the following "True" if it is a valid logical equivalence, or "False" otherwise.



2. [True or False?] Let P(x) be a proposition about an integer *x*, and suppose you want to prove the theorem $\forall x \ (P(x) \Rightarrow Q(x))$. Mark each of the following proof strategies "True" if it would be a valid way to proceed with such a proof, or "False" otherwise.

Find an x such that $Q(x)$ is true or $P(x)$ is false.
Show that, for every <i>x</i> , if $Q(x)$ is false then $P(x)$ is false.
Assume that there exists an x such that $P(x)$ is false and $Q(x)$ is false and derive a contradiction
Assume that there exists an x such that $P(x)$ is true and $Q(x)$ is false and derive a contradiction

3. [Proof] Suppose you have a rectangular array of pebbles, where each pebble is either red or blue. Suppose that for every way of choosing one pebble from each column, there exists a red pebble among the chosen ones. Prove that there must exist an all-red column.