Quiz Questions: Proofs

1. Suppose you are examining a conjecture of the form $\exists x\, P(x)$. To show that the conjecture is false, you need to show which of the following?
   A. There is a value x that makes $P(x)$ false.
   B. $P(x)$ is false for all possible values of x.
   C. $P(x)$ is true for at least one value of x.
   D. $P(x)$ is true for all possible values of x.

2. Suppose you are examining a conjecture of the form $\forall x\, (P(x) \rightarrow Q(x))$. If you are looking for a counterexample, you need to find a value x such that:
   A. $P(x)$ and $Q(x)$ are true.
   B. $P(x)$ and $Q(x)$ are false.
   C. $Q(x)$ is true and $P(x)$ is false.
   D. $P(x)$ is true and $Q(x)$ is false.

3. Suppose you wanted to prove that the square of every even positive integer ends in 0, 4, or 6. Which type of proof would be the easiest to use?
   A. Proof by contraposition.
   B. Direct proof.
   C. Proof by cases.

4. Suppose you are examining a conjecture of the form $\forall x\, (P(x) \wedge Q(x))$. To show that the conjecture is false, you MUST show which of the following?
   A. There is a value x_1 such that $P(x_1)$ is false and a value x_2 such that $Q(x_2)$ is false.
   B. There is a value x such that either $P(x)$ is false or $Q(x)$ is false.
   C. For every choice of x, $P(x)$ and $Q(x)$ are both false.
   D. For every choice of x, either $P(x)$ is false or $Q(x)$ is false.

5. Suppose you want to prove this theorem by cases: "If n is an odd integer, then n^4 ends in the digit 1 or 5." What cases would you use?
   A. n ends in the digit 1 or 5.
   B. n ends in one of the digits 2, 4, 6, 8, 0, or n ends in one of the digits 1, 3, 5, 7, 9.
   C. n is positive, 0, or negative.
   D. n ends in 1, 3, 5, 7, or 9

6. A proof that $p \rightarrow q$ is true based on the fact that q is true, is known as
   A. Direct proof
   B. Contrapositive proofs
   C. Trivial proof
   D. Proof by cases

7. For proving "if x and y are integers and their sum is even, then their difference is also even",What would be the cases?

A. Case 1: x odd and y even. Case 2: x even and y odd
B. Case 1: $x \geq 0$ and $y < 0$. Case 2: $x < 0$ and $y \geq 0$
C. Case 1: x and y even. Case 2: x and y odd
D. Case 1: $x + y$ even. Case 2: $x + y$ odd

8. Which of the arguments are correct?
   A. All CS students have a laptop. Joe doesn't have one, so he's not a student.
   B. Electric cars are fast. Bob's car is not Electric. So, his car is not fast.
   C. Ali likes action movies. He likes the movie Spy, so Spy is an action movie.
   D. Hunters set a dozen traps. Bob is hunter. So he sets a dozen traps