

Necessary versus Sufficient Conditions: Self-Test Answers

T F 1. Being a mammal is a sufficient condition for being human. False. Being a mammal does not guarantee that one is a human. There are mammals that are not human.

T F 2. Being human is a sufficient condition for being a mammal. True. Being a human guarantees that one is a mammal. As soon as we find out that something is not a mammal, we know that it cannot be a human.

T F 3. Being alive is a necessary condition for having a right to life. True. Nothing that is not alive can have a right to life.

T F 4. Being alive is a sufficient condition for having a right to life. False. There are lots of things that are alive that do not have a right to life. What about, for example, grass? This answer could be questioned by those who think that it is seriously wrong to kill anything that is alive.

T F 5. If it is true that if P then Q, then P is a sufficient condition for Q. True. The truth of P is sufficient for, guarantees the truth of Q.

T F 6. If it is true that if P then Q, then Q is a necessary condition for P. True. If Q is not true, then P is not true. The falsity of Q rules out the truth of P. It is necessary for Q to be true in order for P to be true.

T F 7. If it is true that if P is not the case, then Q is not the case, then P is a necessary condition for Q. True. The truth of P is necessary in order for Q to be true. When P is not true, Q is not true.

T F 8. If it is true that if P is not the case, then Q is not the case, then P is a sufficient condition for Q. False. The truth of P does not guarantee the truth of Q. All we know is that the falsity of P guarantees the falsity of Q. For example, let P be "A student hands in his/her term paper" and Q be "This student gets an A in 341."

T F 9. Something is a brother if and only if it is a male sibling. This means that being a male sibling is both necessary and sufficient for something to be a brother. True. In general if it is the case that P is true if and only if Q is true, then Q is necessary and sufficient for P and P is necessary and sufficient for Q. If anything fails to be male or fails to be a sibling, then it is not a brother. So being a male sibling is a necessary condition for being a brother. Furthermore, it is impossible for anything to be a male sibling and not to be a brother. So being a male sibling is a sufficient condition for being a brother.