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Blank test

Write the negation for the following statements

1. If it rains outside, then I will go to the store
2. There exists a car that has 6 wheels

Write the truth tables for the following statements.

3. $[\sim(A \Rightarrow B)]$

4. $[A \wedge \sim B]$

5. Are the previous Truth tables logically equivalent? If so how can you tell

Write the converse, inverse, and contrapositive for the following statements

6. If the sky is blue, then the sun is up
 - a. Converse:
 - b. Inverse:
 - c. Contrapositive:
7. If Henry is wet then it is raining outside
 - a. Converse:
 - b. Inverse:
 - c. Contrapositive:

Consider the statement

If the light is on, then we are home

Identify the following

8. Hypothesis
9. Antecedent
10. Necessary condition
11. Sufficient condition
12. Conclusion

Prove the following statements

13. If two integers are odd, then their sum is even.

Proof:

14. An integer n is even if and only if n^2 is even

Write the negation for the following statements

1. If it rains outside, then I will go to the store
It is raining outside, and I will not go the store
2. There exists a car that has 6 wheels
All Cars do not have 6 wheels

Write the truth tables for the following statements.

3. $[\sim(A \Rightarrow B)]$

A	B	$A \Rightarrow B$	$\sim(A \Rightarrow B)$
T	T	T	F
T	F	F	T
F	T	T	F
F	F	T	F

4. $[A \wedge \sim B]$

A	B	$\sim B$	$A \wedge \sim B$
T	T	F	F
T	F	T	T
F	T	F	F
F	F	T	F

5. Are the previous Truth tables logically equivalent? If so how can you tell
They are logically equivalent because the last columns of the truth values are the same

Write the converse, inverse, and contrapositive for the following statements

6. If the sky is blue, then the sun is up
 - a. Converse: If the sun is up then the sky is blue.
 - b. Inverse: If the sky is not blue then the sun is down.
 - c. Contrapositive: If the sun is down then the sky is not blue.
7. If Henry is wet then it is raining outside
 - a. Converse: If it is raining outside then Henry is wet.
 - b. Inverse: If Henry is dry then it is not raining outside.
 - c. Contrapositive: If it is not raining outside, then Henry is dry.

Consider the statement

If the light is on, then we are home

Identify the following

8. Hypothesis
If the light is on
9. Antecedent
If the light is on
10. Necessary condition
We are home
11. Sufficient condition
If the light is on
12. Conclusion
We are home

Prove the following statements

13. If two integers are odd, then their sum is even.

Proof:

Suppose x and y are odd integers. Then x and y can be written as $x=2k$ and $y=2a$ for some a and k integers

$x+y$

$$=2k+2a \quad (\text{substitution})$$

$$=2(k+a) \quad (\text{factoring})$$

Since integers are closed over addition $(k+a)$ is an integer

Thus, by def of even $x+y$ is even

14. An integer n is even if and only if n^2 is even

Proof

Case1:

Suppose n is an even integer.

By def of even $n=2k$ for some k in the integers

$n*n$

$$=2k*2k$$

$$=2(2kk)$$

Since integers are closed over multiplication $2kk$ is an integer

By def of even n^2 is even

Case2:

N is an even integer and n^2 is odd

Proof:

Let n be an odd integer and n^2 be even

By def of even $n=2k$ for some k in the integers

$$n \cdot n$$

$$=(2k+1) \cdot (2k+1)$$

$$=4k^2+4k+1$$

$$=2(2k^2+2k)+1$$

By the closure property of integers $(2k^2+2k)$ is an integer.

By def of odd $n \cdot n$ is odd

This is a contradiction because n^2 cannot be both odd and even

Thus if n is even n^2 is also even

