

Tautologies

Find the logical structure of the following sentences (break them into propositions and identify the form of the statement). Then match them with the list of tautologies. There's one statement for each tautology in the list, but the sentences are not necessarily in the same order.

For instance, consider the first sentence:

1) A person is either a woman or not a woman.

It can be broken down to match one of the tautologies in the list of tautologies in the following way: If we say that our proposition p is "**this person is a woman**", then it has the shape $p \vee \neg p$, which is also the first tautology in the list.

You may regard the following as synonymous: Means, leads to, implies, if ... then, and \rightarrow .

The following are also synonymous: Is equivalent to, saying that ... is the same as saying that..., if and only if, and \leftrightarrow .

Now, match the rest of the sentences with the list of tautologies. Remember that each tautology matches only one sentence:

2) If $2 + 2 = 5$ means that this sentence is true if and only if it is false, then $2 + 2 \neq 5$.

3) If being a Tanzanian means that you're an African and being a Dane means that you're a European, then being a Tanzanian or a Dane means that you're an African or a European.

4) If being a Tanzanian means that you speak Swahili and you don't speak Swahili, then you're not a Tanzanian.

5) If you're either a man or a beast and you're not a beast, then you're a man.

6) If you're a Tanzanian and being a Tanzanian means that you speak Swahili, then you speak Swahili.

7) If you're a human being and you're tall, then you're a human being.

8) If being a cow means producing milk and producing milk means being kept as a domesticated animal, then being a cow means being kept as a domesticated animal.

9) If you're a human being then you're either a human being or a bicycle.

10) Saying that a person is not tall and skinny is the same as saying that the person is not tall or the person is not skinny.

- 11) Saying that being a Tanzanian means that you're an African and that being a Kenyan means that you're an African is the same as saying that being a Tanzanian or a Kenyan means that you're an African.
- 12) Saying that if you're very motivated and you're studying hard then you're more likely to pass your exams is the same as saying that if you're very motivated then studying hard means that you're more likely to pass your exams.
- 13) Saying that it is not true that living in the countryside means being poor is the same as saying that people who live in the countryside are not poor.
- 14) Saying that if a person is a Tanzanian then he speaks Swahili is the same as saying that if a person doesn't speak Swahili then he is not a Tanzanian.
- 15) Saying that being a bird means that you're not a fish is the same as saying that being both bird and fish means that this sentence is true if and only if it is false.
- 16) Saying that living in the countryside is means being poor is the same as saying that either you don't live in the countryside or you're poor.
- 17) Saying that there is a cat in my house, and that having a cat in your house is the same as having no problems with mice, is the same as saying that there are no problems with mice in my house.
- 18) Saying that living in the countryside is equivalent to being poor is the same as saying that either you live in the countryside and you're poor or you don't live in the countryside and you're not poor.
- 19) Saying that being a Tanzanian means that you speak Swahili and that being a Tanzanian means that you're an African is the same as saying that being a Tanzanian means that you speak Swahili and are an African.
- 20) Saying that a person is not tall or skinny is the same as saying that the person is not tall and the person is not skinny.
- 21) Saying that living in the countryside is equivalent to being poor is the same as saying that living in the countryside means being poor and being poor means living in the countryside.
- 22) Saying that a person speaks Swahili, or that being a Swahili speaker is the same as being able to speak Swahili, is the same as saying that being a Swahili speaker is the same as being able to speak Swahili.
- 23) Saying that living in the countryside is equivalent to being poor is the same as saying that not living in the countryside is equivalent to not being poor.
- 24) My shirt is blue, and it is grey or green if and only if it is blue and grey or it is blue and green.

- 25) Saying that being poor is equivalent to living in the countryside is the same as saying that living in the countryside is equivalent to being poor.
- 26) Saying that it is false that somebody is not a woman is the same as saying that she is a woman.
- 27) My shirt is blue, or it is grey and green if and only if it is blue or grey and it is blue or green.
- 28) It is not true that anybody can be both a woman and not a woman.
- 29) Saying that a cow is an animal, or that this sentence is true if and only if it is false, is the same as saying that a cow is an animal.
- 30) Saying that somebody is a woman is the same as saying that that she is a woman and that she is a woman.
- 31) Saying that a cow is an animal, and that this sentence is true if and only if it is false, is the same as saying that this sentence is true if and only if it is false.
- 32) My shirt is blue, and it is old and soft if and only if it is blue and old, and it is soft.
- 33) Saying that a person is a woman or a man is the same as saying that the person is a man or a woman.
- 34) My shirt is made of cotton, or it is made of wool or silk if and only if it is made of cotton or wool, or it is made of silk.
- 35) If somebody is a woman then she is a woman.
- 36) If being a Tanzanian means that you're an African, then being a Tanzanian or a European means that you're an African or a European.
- 37) Saying that somebody is a woman is the same as saying that that she is a woman or that she is a woman.
- 38) Saying that a person is tall and a man is the same as saying that the person is a man and tall.