Philosophy 1115 (Logic) Homework Assignment #1 Solutions

T $\boxed{F}$ 1. If an argument has a false conclusion it is invalid.

- We have seen (in our big table from lecture #3) a counterexample to this claim. Here's another:

($\mathcal{A}_1$)
All wines are whiskeys.
Chardonnay is a wine.
∴ Chardonnay is a whiskey.

T $\boxed{F}$ 2. The moon is made of green cheese.

- I threw this in to make sure you're awake. This is not a *logical* falsehood, but it's a *falsehood*.

T $\boxed{F}$ 3. No unsound arguments have a true conclusion.

- We have seen (in our big table from lecture #3) two counterexamples to this claim. Here's one:

($\mathcal{A}_3$)
All wines are beverages.
Chardonnay is a beverage.
∴ Chardonnay is a wine.

($\mathcal{A}_3$) is *invalid*, hence it is *unsound* (it happens to also have true premises *and* a true conclusion).

$\boxed{T}$ **F** 4. If it is not possible for the conclusion of an argument to be false, then the argument is valid.

- This is one of the two "odd cases" of validity I discussed in lecture. If it is impossible for the conclusion to be false (period), then it is also impossible for the conclusion to be false *while the premises are true*. So, by the definition of validity, all such arguments are valid.

T $\boxed{F}$ 5. Every invalid argument has a false conclusion.

- Argument ($\mathcal{A}_3$) above is a counterexample to this claim.

$\boxed{T}$ **F** 6. Some invalid arguments have a false conclusion.

- We have seen (in our big table from lecture #3) two examples of this. Here's one of them:

($\mathcal{A}_6$)
All wines are beverages.
Ginger ale is a beverage.
∴ Ginger ale is a wine.

$\boxed{T}$ **F** 7. All sound arguments are valid.

- This is just part of the definition of soundness.

$\boxed{T}$ **F** 8. If two arguments have identical logical form, then either they are both valid or they are both invalid.

- If two arguments have *identical* logical form (in a general sense), then they instantiate *all the same* logical forms (of *all* kinds). Since an argument is valid iff it instantiates *some* valid form (of *some* kind), this claim is (generally) true.

T $\boxed{F}$ 9. If an argument has true premises and a true conclusion, then it is sound.

- Argument ($\mathcal{A}_3$) above is a counterexample to this claim.

T $\boxed{F}$ 10. No unsound arguments have a false conclusion.

- Argument ($\mathcal{A}_6$) above is a counterexample to this claim.

$\boxed{T}$ **F** 11. If the conclusion of a valid argument is false, then at least one of its premises is false.

- By definition, if a valid argument has all true premises, then its conclusion must also be true. Therefore, if the conclusion of a valid argument is false, then it can't be the case that all of its premises are true. So, if the conclusion of a valid argument is false, then some (*i.e.*, *at least one*) of its premises must also be false.

$\boxed{T}$ **F** 12. Some invalid arguments have a false premise.

- We have seen (in our big table from lecture #3) an example of this. Here it is:

($\mathcal{A}_{12}$)

All wines are whiskeys.
Chardonnay is a whiskey.
∴ Chardonnay is a wine.

$\boxed{T}$ **F** 13. No sound arguments have a false conclusion.

- Let X = the sound arguments, Y = the valid arguments with (all) true premises, and Z = the arguments with true conclusions. The following is a (predicate-logically) valid form:

($\mathcal{A}_{13}$)

1. All Xs are Ys.
2. All Ys are Zs.
∴ 3. All Xs are Zs.

Premise (1) is true by the definition of soundness. Premise (2) is true by the definition of validity. The conclusion (3) *follows*, since ($\mathcal{A}_{13}$) is *valid*. Therefore, all sound arguments are arguments with true conclusions. In other words, no sound arguments are arguments with false conclusions. *QED*.

$\boxed{T}$ **F** 14. Some invalid arguments have a true conclusion.

- Argument ($\mathcal{A}_3$) above is an example of this.

T $\boxed{F}$ 15. Every invalid argument has a true conclusion.

- Argument ($\mathcal{A}_6$) above is a counterexample to this claim.

T $\boxed{F}$ 16. A valid argument with twenty true premises and one false premise is more sound than an argument with three true premises and one false one.

- Soundness (and validity) are *absolute* (*i.e.*, "black-and-white") — *they do not come in "degrees"*.

$\boxed{T}$ **F** 17. Some unsound arguments have a false conclusion.

- Argument ($\mathcal{A}_6$) above is an example of this.

$\boxed{T}$ **F** 18. Some valid arguments are unsound.

- Any valid argument with some false premises will do, *e.g.*, argument ($\mathcal{A}_1$) above.

T *F* 19. No invalid arguments have a false conclusion.

- Argument ($\mathcal{A}_6$) above is a counterexample to this claim.

T *F* 20. If the conclusion of a valid argument is false, then all of its premises are false as well.

- Argument ($\mathcal{A}_1$) above is a counterexample to this claim (since its *second* premise is *true*).

T *F* 21. If the conclusion of a valid argument is true, the premises must be true as well.

- We have seen (in our big table from lecture #3) a counterexample to this claim. Here it is:

($\mathcal{A}_{21}$)

All wines are soft drinks.
Ginger ale is a wine.
∴ Ginger ale is a soft drink.

T F 22. If an argument is sound, then its conclusion follows from its premises.

- By definition, all sound arguments are valid. And, "$\mathcal{A}$ is valid" is *synonymous* with "$\mathcal{A}$'s conclusion follows from $\mathcal{A}$'s premises".

T *F* 23. All unsound arguments are invalid.

- We have seen (in our big table from lecture #3) two counterexamples to this claim. Here's one:

($\mathcal{A}_{23}$)

All wines are whiskeys.
Ginger ale is a wine.
∴ Ginger ale is a whiskey.

T F 24. Some valid arguments have a true conclusion.

- Argument ($\mathcal{A}_{21}$) above is an example of this.

T F 25. Every sound argument has a true conclusion.

- We already proved this in our answer to #13 above.

T *F* 26. If an argument is valid absolutely, then it is also sententially valid.

- Any *predicate-logically* valid argument (which is *not* also *sententially* valid) will be a counterexample to this claim. For instance, argument ($\mathcal{A}_{21}$) above. Argument ($\mathcal{A}_{21}$) is *predicate-logically* valid (hence, "absolutely" valid, to use Forbes's term — which just means that it instantiates *some* valid form of *some* kind). But, it is *not sententially* valid.

T *F* 27. The following is a valid sentential form:

If P then Q
Q
∴ P

- This is *affirming the consequent*, which is *not* a sententially valid form (which just means that it has *some* invalid instances).

T F 28. The following is an invalid sentential form:

Either P or Q
∴ P

- Let P = today is Tuesday and Q = today is Thursday. Then (if today is, in fact, Tuesday) the premise is true, but the conclusion is false. So, there are instances of this argument (form) that have *true premises and a false conclusion.* So, this argument (form) must be *invalid.*

$\boxed{T}$ **F** 29. The following argument is valid (absolutely): “Pete Sampras is a professional football player. If Pete Sampras is a professional football player, then Pete Sampras is bald. Therefore, Pete Sampras is bald.”

- This argument is *sententially* valid (*modus ponens*). So, it is valid “absolutely”.

T $\boxed{F}$ 30. The following argument is sound (absolutely): “If Prince William is unmarried, then Prince William is a bachelor. Prince William is a bachelor. Therefore, Prince William is unmarried.”

- I originally wrote this one (years ago) before Prince William got married. Given that he is now married, it is easy to see that this argument is *unsound* (it’s second premise is *false*). But, *even if* Prince William *were* still unmarried, the argument would (*still*) not be sound. This is because it is not *sententially* valid (its sentential form is *affirming the consequent*), and it is not something we’re going to call “absolutely” valid either, since one would need to know the meanings of “unmarried” and “bachelor” to rule-out counterexamples to its validity (*i.e.*, cases in which its second premise is true but its conclusion is false).