Logical Strength

Example 8 from last week:

$(B \ \& \ (C \rightarrow A)) \rightarrow \neg C$
$B \ \& \ A$
$B \ \& \ \neg C$

What does it take to make the premises true? And does that also make the conclusion true?

How about example 7?

$(A \vee B) \leftrightarrow C$
$B \vee \neg C$
$A \vee \neg C$

This is a different way of checking whether an argument is valid, and it's more efficient than a truth table because we can skip the equivalent of writing some of the lines. (There's a rigorous way to do this -- truth trees -- that you might learn about if you take a logic class.)
This is what you'll do with real-life arguments: figure out what it takes to make the premises true, and whether that also makes the conclusion true.

Practice:

In these puzzles, instead of checking whether an argument is valid, you'll need to figure out what follows from some assumptions -- what ways are there of making them true, and what else also has to be true in those cases?

Here are some assumptions that hold true for all the puzzles: you are in a country inhabited by both humans and vampires. Humans always tell the truth and vampires always lie. But also, every inhabitant is either sane or insane. Sane inhabitants believe all and only true things, and insane inhabitants believe all and only false things. (So, an insane vampire will believe that 2+2=5, since that's false, and will then lie and tell you that 2+2 isn't 5!) You talk to some of the inhabitants, and your job is to figure out — if possible — what type each of them is: human or vampire, sane or insane.
In puzzles 1-5, one is a vampire and the other is human, but you don't know which is which or whether they're sane or not. In puzzles 6-10, either both of them are vampires or both are human, but you don't know which or whether they're sane or not.

1. A: We are both insane.
   B: That's not true!

2. A: I am human.
   B: I am human.
   A: B is sane.

3. A: I am a vampire.
B: I am human.
A: We are either both sane or both insane.

4. A: At least one of us is insane.
B: That's true.
A: I am not a vampire.

5. In this case, you also know that one is sane and one is insane.
A: B is a vampire.
B: A is insane.

6. A: B is human.
B: A is a vampire.
A: One of us is sane and one of us isn't.

7. A: Whatever B says is true.
B: A is insane.

8. A: We are both vampires.
B: Yes, we are.
A: We are either both sane or both insane.

9. A: We are both insane.
B: That is true.

10. A: At least one of us is insane.
B: That's not true!
A: We are both human.

Adding or Subtracting Premises

The more the premises imply, the *stronger* they are. If an argument is invalid, it means the premises aren't strong enough to imply the conclusion. So you might have to add more premises.

Practice:

Add premises to make the arguments below valid.

1. Every useful electronic device has at least 5GB of memory. Therefore, this iPod is not a useful electronic device.
2. Some giraffes can be tamed. Anything that can be tamed can either be ridden or eaten. Therefore, I can ride this giraffe.
3. Dinosaur bones are awesome. This treehouse is made of dinosaur bones. Therefore, this treehouse is awesome.

Which premises should you add?

- When you're dealing with real-life arguments, often there will be lots of really plausible things you can fill in (*hidden premises*).
- Sometimes the really plausible hidden premises still aren't enough! Then you have to get creative.
  - Don't stick with the first thing you think of; keep trying different premises for a while. It's good to be able to see what kinds of things you could add to make an argument valid, because it's good to know what ways there are of getting to the conclusion.
  - Think: why might someone believe the conclusion, if they also believe these given premises? If you can come up with an answer to this question, that might point toward a plausible premise to add.
- Sometimes you might want to make the premises weaker! You don't want the premises to be stronger than they need to be.
  - Having premises that are too strong doesn't affect the validity of an argument, but it might affect soundness. The stronger the premises are, the more it takes to make them true. So if the premises are too strong, then there might be ways of making the premises false that don't make the conclusion false.
  - If you're reconstructing someone else's argument, and the premises of your version are stronger than they need to be, then you might have made a *strawman* argument (an implausible version of the other person's argument that's easy to defeat), or at least you might not have been as *charitable* as you could have. Next time we'll learn about interpreting arguments charitably; the basic idea is that you try to reconstruct the person's argument in a way they would be happy with. This is important because you want to know what argument they're actually making, and if you don't reconstruct it charitably you probably won't get the right version.