Distinguishing Valid and Invalid Deductive Arguments

The following method can’t be used to evaluate every deductive argument, but it can be used to evaluate many of them.

Let’s start by noticing that there are four very common argument forms that we tend to encounter in everyday discourse:

<table>
<thead>
<tr>
<th>Valid</th>
<th>Invalid</th>
</tr>
</thead>
<tbody>
<tr>
<td>If (a) then (b)</td>
<td>If (a) then (b)</td>
</tr>
<tr>
<td>(a)</td>
<td>Not-(b)</td>
</tr>
<tr>
<td>(b)</td>
<td>Not-(a)</td>
</tr>
</tbody>
</table>

By translating common sentences like “All dogs are mammals” into a conditional (if___ then ____ ) format, we can easily test arguments for validity. Consider the following example:

“Every human has a heart. Jim is a human, so he must have a heart.”

We can see that the conclusion of this argument is “Jim has a heart”, so we can set the argument up as follows:

Every human has a heart  
Jim is a human  
_______________________  
Jim has a heart

To test this argument for validity, all we need to do is translate the first sentence into a conditional form. Here’s a rough guideline for how to do it:

The words “all”, “every”, and “if” generally introduce the antecedent (the “a” term) of our conditional. The words “only” and “only if” generally introduce the consequent (the “b” term) of our conditional.
So the sentence “Every human has a heart” can be translated to read, “If something is a human, then it has a heart”

Our argument now looks like this:

If something is a human, then it has a heart.
Jim is a human.
____
Jim has a heart.

Notice that this argument has the same structure as the left-most argument in the table above. Now we know it’s valid!

Consider the next argument:

“Only shmurples like purple. Burple is a shmurple, so Burple must like purple.”

We can set the argument up as follows:

Only shmurples like purple
Burple is a shmurple
___
Burple likes purple

To find out if it’s a valid argument, translate the first premise:

If something likes purple, then it’s a shmurple
Burple is a shmurple
___
Burple likes purple.

Once we compare this to the table above, we see that the argument is invalid.
“CHEAT SHEET” for testing validity

Antecedent words (“If”):  
If, all, every, when

Consequent words (“then”):  
Only, only if, only when

**All cats** are fluffy. = If (cat) then (fluffy)  
**Only cats** are fluffy. = If (fluffy) then (cat)

I’m tired **only when I’m sick.** = If (tired) then (sick)  
I’m sick **if I’m tired.** = If (tired) then (sick)  
**Every tired person** is sick. = If (tired) then (sick)
Only teachers are bald. This means Toño must be bald, because he’s a teacher.

Only teachers are bald = If (bald) then (teacher)

A   B

T. is a teacher = B

T. is bald = A
Every cat is perfect, but I’m not perfect. So I’m not a cat.

Every cat is perfect

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>I’m not perfect</td>
<td>Not B</td>
</tr>
<tr>
<td>I’m not a cat</td>
<td>Not A</td>
</tr>
</tbody>
</table>