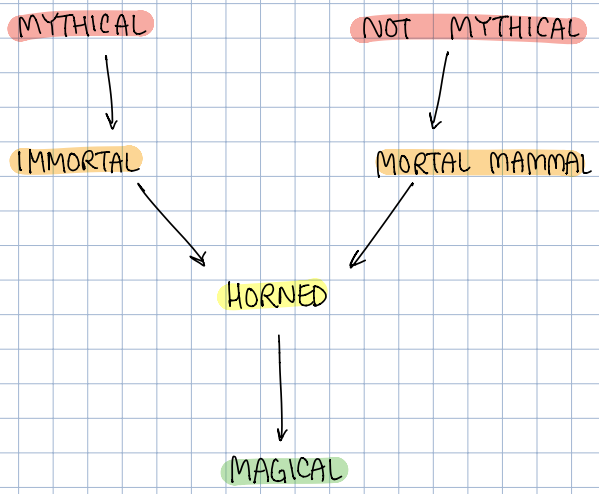
① (Adapted from Barwise and Etchemendy (1993).) Given the following, can you prove that the unicorn is mythical? How about magical? Horned?

If the unicorn is mythical, then it is immortal, but if it's not mythical, then it is a mortal mammal. If the unicorn is either immortal or a mammal, then it is horned. The unicorn is magical if it is horned.



a) Is the unicorn mythical?

we cannot prove the unicorn is mythical because nothing points to the mythicality. If being magical meant being mythical we'd be able to prove it's immortal, but we weren't given that rule.

b) Is the unicorn magical and/or horned?

We can prove that the unicorn is both horned and magical because, no matter the starting point, all roads lead to it being horned and magical.

→ suppose unicorn is mythical
→ mythical means it's immortal
→ immortal means it is horned
→ horned means it is magical

→ suppose unicorn is not mythical
→ not mythical means it's a mortal mammal
→ mammal means it's horned
→ horned means it's magical

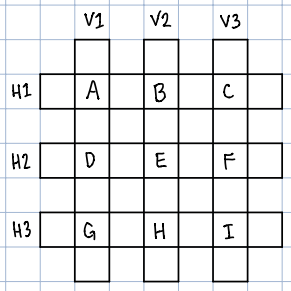
c) Speculate if you could program this in Prolog easily.

I feel like this would be relatively easy to program in Prolog even though Prolog doesn't assert false.

```
immortal(X) :- mythical(X).
mortal_mammal(X) :- not_mythical(X).
horned(X) :- immortal(X); mortal_mammal(X).
magical(X) :- horned(X).
```

But if the only way to imply that the only two options to start are mythical(X) and not_mythical(X) is by saying mythical(X) and !mythical(X) then it would be a lot more difficult because Prolog doesn't do that.

②




```
word(astante, a,s,t,a,n,t,e).
word(astoria, a,s,t,o,r,i,a).
word(baratto, b,a,r,a,t,t,o).
word(cobalto, c,o,b,a,l,t,o).
word(pistola, p,i,s,t,o,l,a).
word(statale, s,t,a,t,a,l,e).
```

```
crossword(V1, V2, V3, H1, H2, H3) :- word(V1, _, A, _, D, _, G, _),
                                     word(V2, _, B, _, E, _, H, _),
                                     word(V3, _, C, _, F, _, I, _),
                                     word(H1, _, A, _, B, _, C, _),
                                     word(H2, _, D, _, E, _, F, _),
                                     word(H3, _, G, _, H, _, I, _),
                                     V1 \== V2,
                                     V1 \== V3,
                                     V1 \== H3,
                                     V1 \== H2,
                                     V1 \== H1,
                                     V2 \== V3,
                                     V2 \== H3,
                                     V2 \== H2,
                                     V2 \== H1,
                                     V3 \== H3,
                                     V3 \== H2,
                                     V3 \== H1,
                                     H3 \== H2,
                                     H3 \== H1,
                                     H2 \== H1.
```