

## 2.24.1. Truth Tree Validity Problems

**A. Translate** each of the following arguments into formal language, then use **truth trees** to decide whether the argument is **valid**.

1. We're not having truffles, but we're having grappa.  $\therefore$  We're not having *both* truffles *and* grog.

2. Letitia won't get an A unless she's a genius who doesn't need to study. Letitia needs to study.  $\therefore$  Letitia won't get an A.

3. Shao Lin Logic was filmed in either Hong Kong or Beijing.  
Shao Lin Logic featured fight scenes, but didn't use stunt men.  
 $\therefore$  Shao Lin Logic was filmed in Hong Kong unless it used stunt men.

4. Kangaroos are indigenous to either Europe or Australia. Kangaroos are indigenous to either Australia or South America. Kangaroos aren't indigenous to Europe.  $\therefore$  Kangaroos are indigenous to South America.

5. Neither Kitty nor Dr. Slim has either a law degree or a medical license.  $\therefore$  Neither Kitty nor Dr. Slim has both a law degree and a medical license.

6. Either Timbuktu Tech will win the game without going into overtime, or Bleak Prairies University will win the game without advancing to the finals. Timbuktu Tech will neither go into overtime nor win the game.  
 $\therefore$  Bleak Prairies University won't advance to the finals.

7. Jack will complain unless we're not having tuna for dinner. Neko will complain unless we are having tuna for dinner.  $\therefore$  Either Jack will complain or Neko will.

8. Lucretia's a goth who likes absinthe. Lucretia's not a goth who likes grappa.  $\therefore$  Lucretia's a goth who likes absinthe but not grappa.<sup>1</sup>

9. Neither Rex nor Jack can fly.  $\therefore$  Neither Rex nor Jack is a cat that can fly.<sup>1</sup>

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<sup>1</sup> On translating the negation of a sentence with a relative clause, see 2.10 §3.

10. Barbie will both plan and attend the formal dance, though she's not in the Logician's union. Rex will attend the formal dance, though neither Neko nor Jack will.  $\therefore$  Neither will Neko or Jack attend the formal dance, nor will Rex bring home leftovers.<sup>2</sup>

11. Either Jack scaled the Cathedral of Learning but Barbie didn't, or he para-surfed over Niagara Falls. Jack didn't para-surf over Niagara Falls unless he scaled the Cathedral of Learning.  $\therefore$  Barbie didn't scale the Cathedral of Learning.

12. Neko won't get a massage unless she gets neither lip waxing nor cool sculpting. Though she won't get cool sculpting, Neko will get French tips.  $\therefore$  Neko will get French tips without getting a massage.

13. The senate will approve Logic funding without holding a special hearing. The governor will approved Logic funding unless the senate holds a special hearing.  $\therefore$  Both the senate and the governor will approve Logic funding.

*(What would the truth tree for this argument look like if we broke down the first premise last?)*

14. Either both Letitia and Lucretia are going to Logicpalooza or Barbie isn't. Letitia isn't going to Logicpalooza, but either Lucretia or Barbie is.  $\therefore$  Lucretia's going to Logicpalooza.

15. We're having truffles, but neither grog nor grappa.  $\therefore$  We're either having truffles but not grog, or truffles but not grappa.

16. Unless Suki passed the final in Business Logic without studying for it, she didn't get an A in the course. Suki didn't study for both the final in Business Logic and the one in Quantum Cosmetology. Though Suki isn't always responsible, she did study for the final in Quantum Cosmetology.  $\therefore$  Suki didn't get an A in Business Logic.

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<sup>2</sup> Warning: a truth table for this argument would take 1,935 steps – counting each 1, 0, and sentence as a step.

17. Neither Trixie nor Elvis will serve on the committee unless Dr. Slim wins the vote. Elvis will serve on the committee without Trixie doing so. The new rules will pass without Dr. Slim winning the vote, unless either Deacon or Tangelo challenges them.  $\therefore$  Tangelo will challenge the new rules.

18. Either Dick had rum punch or Dora did. Either Dick didn't have rum punch or Dora did. Either Dick had rum punch or Dora didn't.  $\therefore$  Both Dick and Dora had rum punch. (*Time-saving hint: start with the conclusion, then work down through the premises.*)

19. Neko sold her flying toaster without testing it unless the safety inspector visited. Either Neko tested her flying toaster or the safety inspector didn't visit.  $\therefore$  Either Neko sold her flying toaster without the safety inspector visiting, or the safety inspector visited and Neko tested her flying toaster.

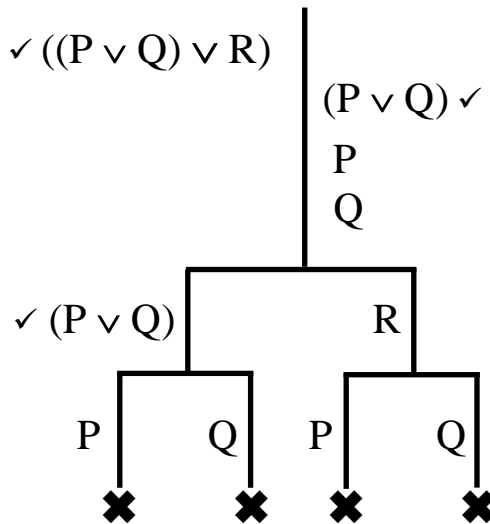
20. Dick will have either a martini or an Old Fashioned, and so will Dora.  $\therefore$  Either Dick and Dora will both have a martini, or they'll both have an Old Fashioned.

**B.** The following argument is clearly **invalid** (since the actual world serves as a validity counterexample).

1. Kangaroos are indigenous to either Europe, or South America, or Australia	1. $(P \vee Q) \vee R$
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$\therefore$ Kangaroos are indigenous to either Europe or South America.	$\therefore (P \vee Q)$

But in the following tree for the argument every path closes – thereby (wrongly) judging the argument to be **valid**.

### 💀 A Flawed Tree 💀



**Explain what mistake has been made** in this truth tree.