

A list of Hints and Solutions for LPL

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This document describes the exercises in LPL for which hints and solutions are currently provided. We strongly encourage instructors to assign these exercises (as well as additional exercises, of course), since the solutions provided are designed to help students who might otherwise be confused over some point or other.

The software that comes with LPL allows one to present interesting exercises that are quite helpful for students and quite different than traditional logic exercises. If you just assign the kinds of exercises you are used to from other textbooks, your students will miss some of the most valuable opportunities to learn.

Chapter 1

Section 1.3 (page 25)

1.4 Translations are given for 1, 4, 7, and 10.

1.7 We have filled in about half the table.

Section 1.4 (page 29)

1.8 1. We give four of eight answers.

2. We tell the student that there are sixty-four but ask them why.

1.9 Translations are given for 1, 3, and 6.

1.10 Translations are given for 1 and 3.

1.11 Translations are given for 1 and 3, with a hint for 2.

Section 1.5 (page 34)

1.12 Translations are given for 1 and 4.

1.13 The table is partially filled in.

1.16 Translations are given for 2 and 4.

Section 1.7 (page 39)

1.20 A derivation is given for number 2.

Chapter 2

Section 2.1 (page 44)

2.1 The table is partially filled in.

2.2 Solutions are given for 1 and 4, and a strong hint for number 7.

2.3 Solutions are given for 1 and 3.

Section 2.2 (page 53)

2.6 A proof is given.

2.8 A counterexample is described.

2.11 A counterexample is described.

2.14 A proof is given.

Section 2.4 (page 62)

2.16 A proof is given.

2.19 A proof is given.

Section 2.5 (page 65)

2.22 A counterexample is described.

2.24 A formal proof is given.

2.27 A formal proof is given.

Chapter 3

Section 3.1 (page 70)

3.2 Answers are given for 1, 4, 5, and 8.

3.4 The asked for procedure is described.

Section 3.2 (page 73)

3.7 One world is shown but the students are asked to submit a different world.

Section 3.5 (page 81)

3.14 A hint is given.

Section 3.7 (page 86)

3.20 Transations are shown for 1, 4, 7, and 10.

3.21 Transations are shown for 1, 4, 7, and 10.

3.24. Transations are shown for 1 and 2.

Section 3.8 (page 91)

3.26 Solutions are given for 1 and 4.

Chapter 4

Section 4.1 (page 104)

4.2 The truth table for number 1 is given and interpreted.

4.5 The truth table is given and interpreted.

4.9 This is an important excercise. The table is partially filled in.

Section 4.2 (page 109)

4.12 The truth table is given and interpreted.

Section 4.3 (page 113)

4.21 The truth table is given and interpreted.

Section 4.4 (page 116)

4.26 Complete proofs of Taut Con 1 and Taut Con 2 are given.

Section 4.5 (page 120)

4.31 Negation normal forms of all five sentences are given.

4.33 A solution is given.

Chapter 5

Section 5.1 (page 131)

5.1 A solution is given.

5.2 A solution is given.

Section 5.2 (page 134)

5.7 An informal proof is given.

Section 5.3 (page 139)

5.16 An informal proof is given.

5.17 Students are told that the argument is valid and given a hint as to how to start their proof.

5.23 We give a proof by contradiction.

5.26 We start the proof and ask the student to complete it.

Chapter 6

Section 6.2 (page 154)

6.2 A complete formal proof is given.

6.4 A complete formal proof is given.

6.9 A complete formal proof is given.

Section 6.3 (page 161)

6.10 One of many possible counterexamples to the argument is given.

Section 6.4 (page 166)

6.19 A partial proof is given. Students are asked to fill in the missing steps, rules, and supports.

Section 6.5 (page 172)

6.28 A complete formal proof is given.

Section 6.6 (page 174)

6.34 A complete formal proof is given.

Chapter 7

Section 7.2 (page 183)

7.2 The truth table is shown and interpreted.

7.5 The truth table is shown and interpreted.

7.12 Translations are given for every third sentence, starting with sentence 1.

7.16 A hint is given.

Section 7.4 (page 194)

7.25 Answers are given for two of the sentences.

7.29 A solution is given.

Chapter 8

Section 8.1 (page 203)

8.1 Answers are given for 1, 4, and 7.

8.4 An informal proof is given.

8.7 An informal proof is given.

Section 8.2 (page 212)

8.18 A counterexample to Affirming the Consequent is given.

8.21 A counterexample is given but the student is asked to give a different one.

8.24 A formal proof is given.

8.29 An incomplete formal proof is given. The student must fill in the missing ingredients.

8.32 An incomplete formal proof is given. The student must fill in the missing ingredients.

8.35 An incomplete formal proof is given. The student must fill in the missing ingredients.

Section 8.3 (page 221)

8.39 Part of the truth table is shown below, enough of it to show that there is a row where the premises are true and the conclusion false in that row. WE then discuss why this shows that the conclusion cannot be proved from the premises in the system \mathcal{F}_T .

Section 8.4 (page 223)

8.44 A hint is given.

8.45 A hint is given.

8.46 An incomplete formal proof is given. Students have to complete it.

8.50 A hint is given.

8.53 The solution is given.

Chapter 9

Section 9.3 (page 234)

9.1 We have fixed the first four sentences.

9.2 We give one possible way of fixing up each odd numbered sentence.

Section 9.4 (page 238)

9.7 A solution is given.

Section 9.5 (page 241)

9.9 We give one of many worlds that make all of Aristotle's Sentences true and ask the student to try to build one with just four blocks.

9.12 We give translations of 1, 4, 7, and 10.

Section 9.6 (page 247)

9.16 We give translations of every third sentence, starting with sentence 1.

9.19 We give translations of 1, 4, 7, and 10.

Section 9.7 (page 253)

9.23 We give answers to 1, 4, 7, and 10.

Chapter 10

Section 10.1 (page 264)

10.1 We have filled in rows 1, 4, 7, and 10. If the student understands these, they should have no problem with the others.

10.2 We provide most of a solution.

Section 10.2 (page 273)

10.8 We provide a solution.

10.9 We provide a partial solution.

10.11 A complete solution is provided.

10.15 A complete solution is provided.

Section 10.4 (page 265)

10.24 A counterexample is provided.

Section 10.5 (page 270)

10.30 A solution is provided.

Chapter 11

Section 11.1 (page 291)

11.4 Answers are given for 1, 4, and 7.

11.7 Answers are given for 2, 4, 7, and 9.

Section 11.2 (page 296)

11.10 We present extensive discussions of every third sentence, beginning with sentence 2.

11.13 We give some some hints.

Section 11.3 (page 299)

11.17 We give translations of every third sentence, beginning with number 1.

Section 11.4 (page 302)

11.18 We paraphrase and then translate numbers 1 and 4.

11.20 We give translations of 1, 4, 7, and 10. With number 7, we provide a discussion of its seeming ambiguity.

11.21 We translate 1, 4, 7 and 10, giving an extended discussion of 10.

Section 11.8 (page 316)

11.40 We translate 1, 4, and 10, and give a hint on number 7.

Chapter 12

Section 12.3 (page 327)

12.1 A complete solution is given. It is quite helpful to students to work through this.

12.4 An informal proof is given.

12.6 A counterexample is given.

Section 12.4 (page 334)

12.11 We give a discussion of the error in the purported proof.

12.16 We give an informal proof.

12.19 We give a counterexample to the argument.

12.28 We give a hint.

Section 12.5 (page 341)

12.30 We give an informal proof that makes explicit the use of the shape axioms.

12.34 We give an informal proof that makes explicit the use of the shape axioms.

Chapter 13

Section 13.1 (page 346)

13.2 A proof is given but the student has to fill in the missing supports.

13.7 A hint is given.

Section 13.2 (page 350)

13.11 A counterexample is provided.

13.14 A hint is given.

Section 13.3 (page 337)

13.20 A complete formalization of our earlier informal proof is given.

13.23 A complete formalization of our earlier informal proof is given.

13.29 A partial proof is given.

13.32 We give a complete formal proof.

13.33 We give a complete formal proof.

Section 13.5 (page 361)

13.40 A complete formal proof is given.

13.51 A sparse outline of a proof is given.

Chapter 14

Section 14.1 (page 371)

14.1 A solution is provided.

14.2 We give translations for 1 and 4.

14.3 We give translations for 1 and 4.

14.6 We give translations for 1, 4, 7, and 10.

Section 14.2 (page 377)

14.10 We give a proof without the justifications filled in.

14.14 A hint is given.

14.15 A hint is given.

14.22 We give an informal proof.

Section 14.3 (page 382)

14.28 We give translations of numbers 1 and 4.

Section 14.4 (page 388)

14.31 We provide solutions for 1, 4, and 7.

14.32 We present solutions for 1, 4, 7, and 10.

Section 14.5 (page 395)

14.33 A solution is provided.

14.37 A solution is provided.

14.41 A solution is provided.

14.45 A solution is provided.

Section 14.6 (page 398)

14.57 1. A translation is given.

4. We discuss why a translation into our language is impossible.

7. We give a hint.

10. We discuss why a translation into our language is impossible.

15. We give a hint.

Chapter 15

Section 15.1 (page 411)

15.1 A hint is given.

15.2 1. We provide a solution.

4. We give a hint.

15.3 We provide solutions for 1 and 4.

15.5 We present a formal proof.

Section 15.2 (page 414)

15.7 Solutions are provided for 1, 4, and 7.

15.13 An incomplete proof is given for the student to complete.

Section 15.3 (page 418)

15.14 The first half of a proof is given.

15.15 We give solutions for 1, 4, and 7.

15.17 We first show a proof of 15.17 under construction and then give the completed proof. This is very helpful to students trying to understand how to give such proofs.

15.21 We give an informal proof.

Section 15.4 (page 421)

15.26 A fairly complete proof is given, leaving only some details of the last part to the student.

Section 15.5 (page 425)

15.29 A proof is given of the second of three goal sentences.

15.36 The table is only partially filled in for the student.

15.38 A solution is provided.

15.41 The equivalence classes for *same row* are given.

Section 15.6 (page 428)

15.46 A partial solution is given.

15.51 A solution is given.

Section 15.7 (page 431)

- 15.54** The solution is given.
- 15.57** A hint is given.
- 15.60** Hints are given for each.
- 15.61** Solutions for 1 and 3 are given.

Section 15.9 (page 439)

- 15.68** Students find this problem difficult, because it is rather different than things they have been doing, even though it uses the ideas from earlier in the course. We present a complete solution.
- 15.69** We give a hint about how to modify the previous solution.
- 15.72** We give the solution to 1 and a hint for 2.

Chapter 16

Section 16.1 (page 449)

- 16.3** We give one of the two requested derivations.
- 16.7** We give a solution.

Section 16.2 (page 453)

- 16.12** We give a solution.
- 16.13** We give a hint.

Section 16.3 (page 455)

- 16.14** We give a solution.
- 16.17** We give a solution.

Section 16.4 (page 458)

- 16.19** We give a partial proof, asking the students to fill in the missing details.
- 16.20** We give a hint.

Chapter 17

Section 17.1 (page 470)

17.1 We give one of several possible answers.

17.3 We give a partial proof, asking the student to fill in some cases that we omit.

Section 17.2 (page 477)

17.5 We give a proof of the formal consistency and part of a proof of formal completeness. The student has to finish the proof.

17.6 We give a hint.

17.7 We give an extended hint.

17.8 We give a hint.

17.9 We give a solution.

17.12 We give a solution.

Section 17.3 (page 486)

17.18 We give a solution.

17.20 We solve number 1.

17.23 We give a solution.

Section 17.4 (page 492)

17.31 We give a partial solution.

Chapter 18

Section 18.1 (page 498)

18.2 Answers are given for 1, 4, and 7.

18.3 A hint is given.

18.4 A hint is provided.

18.5 Solutions are given for 1 and 4.

18.6 Solutions are given for 1 and 4.

Section 18.2 (page 507)

18.7 Solutions are given for 1 and 4.

18.8 Solutions are given for 1, 4, 7, and 10.

18.11 A hint is provided.

18.13 A solution is given.

Section 18.3 (page 512)

18.14 A solution is given.

Section 18.4 (page 514)

18.18 A hint is given.

Section 18.5 (page 516)

18.21 Solutions is given for 1 and 4.

Section 18.6 (page 519)

18.22 olutions is given for 1 and 4.

18.24 A partial solution is given.

Section 18.7 (page 524)

18.27 A hint is given.

Chapter 19

Section 19.2 (page 531)

19.1 Solutions are provided for the first two.

Section 19.3 (page 533)

19.2 Solutions are provided for the first two.

19.4 A solution is provided for the first.

19.5 A hint is provided for the first.

19.6 Solutions are provided for 1 and 4.

Section 19.4 (page 538)

19.10 A complete formal proof is given.

19.11 A hint is given.

19.17

A complete formal proof is given.

Section 19.5 (page 545)

19.19 One solution is given.

19.21 Solutions are given for 1 and 4.

Section 19.7 (page 551)

19.25 An informal proof is given.

19.26 A hint is given.

Section 19.8 (page 555)

19.34 A discussion is given.