

## CHAPTER 5

# Categorical Logic: Statements

The starred items are also contained in the Answer Key in the back of *The Power of Logic*.

## Exercise 5.1

### Part A: Categorical Statements

*Note:* Answers are given in this order: name of form, subject term, predicate term, quantity, and quality.

- \*1. A, hungry cannibals, dangerous people, universal, affirmative
2. E, Ohioans, Texans, universal, negative
3. O, diamonds, valuable objects, particular, negative
- \*4. E, green vegetables, minerals, universal, negative
5. I, outlaws, heroes, particular, affirmative
6. A, equilateral triangles, geometrical figures, universal, affirmative
- \*7. O, poems, sonnets, particular, negative
8. E, junk-food addicts, people with healthy diets, universal, negative
9. I, scoundrels, people who have been mistreated, particular, affirmative
- \*10. O, numbers, odd numbers, particular, negative
11. E, pacifists, warmongers, universal, negative
12. A, mammals, cats, universal, affirmative
- \*13. I, celebrities, highly moral people, particular, affirmative
14. I, criminals, evil people, particular, affirmative
15. A, people who intentionally direct violence at noncombatants for political purposes, terrorists, universal, affirmative
- \*16. E, odd numbers, even numbers, universal, negative
17. I, bank robbers, well-trained professionals, particular, affirmative
18. A, unreported crimes, lamentable events, universal, affirmative
- \*19. I, art critics who like Picasso, snobs, particular, affirmative
20. O, wealthy people, nice people, particular, negative
21. E, sedimentary rocks, volcanic rocks, universal, negative
- \*22. A, individuals who lie frequently, deeply unhappy people, universal, affirmative
23. E, losers, winners, universal, negative
24. I, people who voted for Gore, intelligent people, particular, affirmative
- \*25. E, photons, objects visible to the naked eye, universal, negative
26. O, ancient gods, morally perfect deities, particular, negative
27. A, people who worship monkeys, lunatics, universal, affirmative
- \*28. O, literature professors who love Tolstoy, good lecturers, particular, negative
29. E, created entities, things that have always existed, universal, negative
30. E, humans who are truly happy, people who never work, universal, negative

### Part B: Standard Forms

- \*1. No human beings are beings who can swim across the Atlantic Ocean. (E, universal, negative)
2. All kangaroos are marsupials. (A, universal, affirmative)
3. Some cars are not Fords. (O, particular, negative)

- \*4. Some persons are nerds. (I, particular, affirmative)
- 5. No spiders are insects. (E, universal, negative)
- 6. All ancient Greeks are people who worshiped Zeus. (A, universal, affirmative)
- \*7. Some poems are not sonnets. (O, particular, negative)
- 8. Some saints are reformed criminals. (I, particular, affirmative)
- 9. Some politicians are not liars. (O, particular, negative)
- \*10. I, particular, affirmative
- 11. All patriotic Americans are lovers of justice. (A, universal, affirmative)
- 12. No Vikings are people who were wimps. (E, universal, negative)
- \*13. Some animals that can fly are not birds. (O, particular, negative)
- 14. All people who have committed murder are people who deserve death. (A, universal, affirmative)
- 15. I, particular, affirmative
- \*16. All Shawnees are people who were skillful trackers. (A, universal, affirmative)
- 17. No fools are sages. (E, universal, negative)
- 18. All Masai warriors are superb athletes. (A, universal, affirmative)
- \*19. No people who are unlucky are happy people. (E, universal, negative)
- 20. All college students who listened to Jimi Hendrix are people who opposed the war in Vietnam. (A, universal, affirmative)
- 21. No snakes are mammals. (E, universal, negative)
- \*22. All lizards are reptiles. (A, universal, affirmative)
- 23. No chimpanzees are fish. (E, universal, negative)
- 24. Some bright green stones are not emeralds. (O, particular, negative)
- \*25. All birds are things that have feathers. (A, universal, affirmative)
- 26. All gems are diamonds. (A, universal, affirmative)
- 27. All world-class athletes are people who train vigorously. (A, universal, affirmative)
- \*28. Some paintings are not masterpieces. (O, particular, negative)
- 29. All quarks are physical objects. (A, universal, affirmative)
- 30. All voters are people who will be disappointed. (A, universal, affirmative)
- \*31. Some mountains are beautiful things. (I, particular, affirmative)
- 32. No slugs are intelligent things. (E, universal, negative)
- 33. All soldiers who served under General George Patton are people who saw combat. (A, universal, affirmative)
- \*34. Some trees are ugly things. (I, particular, affirmative)
- 35. No odd numbers are numbers divisible by 2. (E, universal, negative)
- 36. All beautiful things are things that are pleasant to behold. (A, universal, affirmative)
- \*37. Some animals are vicious animals. (I, particular, affirmative)
- 38. All bad-tempered persons are curmudgeons. (A, universal, affirmative)
- 39. All scarlet things are red things. (A, universal, affirmative)
- \*40. All female siblings are sisters. (A, universal, affirmative)
- 41. All dogs over 15 years of age are old dogs. (A, universal, affirmative)
- 42. No tragedies are fortunate events. (E, universal, negative)
- \*43. Some living survivors of the Nazi prison camps are people who were tortured. (I, particular, affirmative)
- 44. All Hindus are people who believe in reincarnation. (A, universal, affirmative)
- 45. No prisoners are people who will be mistreated. (E, universal, negative)
- \*46. Some soldiers are people who will be wounded. (I, particular, affirmative)
- 47. Some whole numbers between 1 and 5 are even numbers. (I, particular, affirmative)
- 48. No living veterans of World War I are people who were generals. (E, universal, negative)
- \*49. Some persons who choose not to fight are not cowards. (O, particular, negative)
- 50. Some animals are dogs. (I, particular, affirmative)

## Exercise 5.2

### Part A: Logical Relationships

*Note:* Superalterns and subalterns are listed in the order in which they appear.

- \*1. Contraries
2. Superaltern/subaltern
3. Subcontraries
- \*4. Contradictories
5. Superaltern/subaltern
6. Subcontraries
- \*7. Subaltern/superaltern
8. Contraries
9. Contradictories
- \*10. None. "Some odd numbers are numbers that can be divided by 2 (without remainder)" is necessarily false; hence, it cannot be true (subcontraries can both be true).
11. Subcontraries
12. Contraries
- \*13. Subcontraries
14. None. "All positive whole numbers between 4 and 6 are odd numbers" is a necessary truth; hence, it cannot be false (contraries can both be false).
15. Subaltern/superaltern

### Part B: Immediate Inferences

- \*1. Valid
2. Valid
3. Valid
- \*4. Valid
5. Invalid
6. Valid
- \*7. Valid
8. Invalid
9. Valid
- \*10. Valid
11. Valid
12. Valid
- \*13. Invalid
14. Valid
15. Valid
- \*16. Valid
17. Valid
18. Valid
- \*19. Invalid
20. Valid

### Part C: Generalizing

- \*1. If the **A** statement is false: The **O** statement is true (corresponding **A** and **O** statements are contradictories). The truth value of the **E** and **I** statements is not guaranteed.
2. If the **E** statement is false: The **I** statement is true (corresponding **E** and **I** statements are contradictories). The truth value of the **A** and **O** statements is not guaranteed.

3. If the **I** statement is false: The **O** statement is true (corresponding **I** and **O** statements are subcontraries). The **A** statement is false (since it implies the **I** statement). The **E** statement is true (since corresponding **I** and **E** statements are contradictories).
- \*4. If the **O** statement is false: The **A** statement is true (corresponding **O** and **A** statements are contradictories), the **E** statement is false (since it implies the **O** statement), and the **I** statement is true (since corresponding **I** and **O** statements are subcontraries).

#### Part D: Standard Form

- \*1. 1. No capitalists are heroes.  
So, 2. Some capitalists are not heroes. **Valid**
2. 1. All immortal beings are gods.  
So, 2. Some immortal beings are gods. **Valid**
3. 1. All misguided moralists are menaces to society.  
So, 2. All menaces to society are misguided moralists. **Invalid**
- \*4. 1. All positrons are things smaller than atoms.  
So, 2. Some positrons are not things smaller than atoms. **Invalid**
5. 1. No falsehoods are beneficial things.  
So, 2. All falsehoods are beneficial things. **Invalid**
6. 1. Some athletes are people who can run the mile in under 4 minutes.  
So, 2. Some athletes are not people who can run the mile in under 4 minutes. **Invalid**
- \*7. 1. No acids are bases.  
So, 2. All acids are bases. **Invalid**
8. 1. All right acts are acts that conform to the Ten Commandments.  
So, 2. No right acts are acts that conform to the Ten Commandments. **Invalid**
9. 1. No categorical arguments are valid arguments.  
So, 2. Some categorical arguments are not valid arguments. **Valid**
- \*10. 1. All persons who are kept awake for over a week are persons who will go crazy.  
So, 2. All persons who will go crazy are persons who are kept awake for over a week.  
**Invalid**
11. 1. All wicked acts are acts committed with malice aforethought.  
So, 2. Some wicked acts are acts committed with malice aforethought. **Valid**
12. 1. Some people who defended slavery are people who were plantation owners.  
So, 2. Some persons who defended slavery are not persons who were plantation owners.  
**Invalid**
- \*13. 1. No persons who invented the airplane are persons who died flying an airplane.  
So, 2. All persons who invented the airplane are persons who died flying an airplane.  
**Invalid**
14. 1. All colonels are authoritarian people.  
So, 2. No colonels are authoritarian people. **Invalid**
15. 1. All acids are chemicals that turn blue litmus paper red.  
So, 2. Some acids are chemicals that turn blue litmus paper red. **Valid**

## Exercise 5.3

### Part A: Term-Complements

- \*1. No things that are not brown bears are nonherbivores.
2. All noncorporals are generals.
3. Some things that are not large birds are noneagles.
- \*4. Some entities that are not unhappy are not nonpeople.
5. No humans are things that are not rational animals.
6. All nondrinkers are drivers.
- \*7. No things that are not great women are nonmen.
8. Some nonathletes are things that are not poor losers.
9. Some smokers are not things that are not healthy people.
- \*10. Some metals are nonchemicals.

### Part B: Conversion

- \*1. No maggots are magnates. Valid
2. All acts of God are miracles. Not in general valid
3. Some nonsquares are rectangles. Valid
- \*4. Some bombs are not explosives. Not in general valid
5. All angels are demons. Not in general valid
6. No loners are lovers. Valid
- \*7. All copies are forgeries. Not in general valid
8. No coaches are roaches. Valid
9. Some Kenyans are not Africans. Not in general valid
- \*10. Some nontigers are leopards. Valid

### Part C: Obversion

- \*1. No shar-peis are nondogs.
2. All platypi are nonvegetarians.
3. Some prime ministers are not nonwomen.
- \*4. Some heroes are nonmartyrs.
5. No shamans are nonpriests.
6. All tulips are nonweeds.
- \*7. No colonels are objects not weighing at least 100 pounds.
8. Some logicians are not nonseptuagenarians.
9. All giants are things not less than 10 feet tall.
- \*10. All serigraphs are nonsculptures.

### Part D: Contraposition

- \*1. All nonpessimists are noncynics. Valid
2. Some roses are nonplants. Not in general valid
3. Some noncomedies are not nondramas. Valid
- \*4. Some dogs are not collies. Valid
5. All things that do not travel at the speed of light are nonphotons. Valid
6. No nonelms are things that are not red oaks. Not in general valid
- \*7. All noncats are things that cannot run at more than 50 miles an hour. Valid
8. Some automobiles are not Fords. Valid
9. All entities that do not have IQs of at least 100 are things that are not college students.  
Valid
- \*10. All guppies are things that are not great white sharks. Valid

### Part E: Inferences from *A* Statements

- \*1. Not guaranteed (converse)
2. T (obverse)
3. T (subaltern)
- \*4. T (contrapositive)
5. T (converse of 2)
6. T (conversion by limitation)
- \*7. Not guaranteed (contrapositive of 2)
8. F (contradictories)
9. F (contraries)
- \*10. T (obverse of 3)
11. T (contrapositive of 10)
12. Not guaranteed
- \*13. T (subaltern of the contrapositive)
14. F (converse of 9)
15. F (converse of the contrary of the contrapositive)

### Part F: Inferences from *E* Statements

- \*1. T (obverse)
2. T (converse)
3. T (subaltern)
- \*4. Not guaranteed (contrapositive)
5. T (obverse of 2)
6. T (subaltern of 2)
- \*7. F (contraries)
8. Not guaranteed (converse of 5)
9. F (contradictories)
- \*10. T (contraposition by limitation)
11. F (converse, obverse, converse by limitation, contradictories)
12. T (obverse of 6)
- \*13. F (obverse, converse by limitation, contradictories)
14. F (converse of 9)
15. T (obverse of 3)

### Part G: Inferences from *I* Statements

- \*1. T (converse)
2. F (contradictories)
3. T (obverse)
- \*4. Not guaranteed (contrapositive of 1)
5. F (converse of 2)
6. Not guaranteed (superaltern)
- \*7. Not guaranteed (contrapositive)
8. Not guaranteed
9. Not guaranteed (subcontrary)
- \*10. Not guaranteed
11. Not guaranteed
12. Not guaranteed (obverse of 9)
- \*13. Not guaranteed
14. Not guaranteed
15. F (obverse, contradictories)

## Part H: Inferences from O Statements

- \*1. Not guaranteed (superaltern)
2. F (contradictories)
3. T (obverse)
- \*4. Not guaranteed (converse)
5. T (contrapositive)
6. Not guaranteed (subcontrary)
- \*7. T (converse of 3)
8. F (contrapositive of 2)
9. F (obverse of 2)
- \*10. Not guaranteed (converse of 5)
11. Not guaranteed (obverse of 1)
12. Not guaranteed (converse of 1)
- \*13. Not guaranteed (obverse of 6)
14. Not guaranteed
15. F (contradictory of 7)