Answer Key for Practice Problems

Chapter 5

Identify the statements:

1. The sky is blue. (statement)
2. Hey, you over there! (not a statement)
3. Chocolate ice cream is better than vanilla. (statement)
4. Birds are flightless creatures. (statement)
5. Greetings! (not a statement)
6. A bachelor is an unmarried man. (statement)
7. Ouch! (not a statement)
8. What color are you painting your room? (not a statement)
9. There are pencils on my desk. (statement)
10. When Caden arrives. (not a statement)

Three Principles of Logic

Identify the principle of logic being expressed:

1. You can't read and not read at the same time. (noncontradiction)
2. Either you do it or you don't. (excluded middle)
3. God is God, no matter what anyone says. (principle of identity)
4. Sara isn't sitting and standing at the same time. (noncontradiction)
5. Jack is C. S. Lewis, and C. S. Lewis is Jack. (principle of identity)
6. Socrates is either alive or dead. (excluded middle)
7. Either bigfoot exists or he doesn't. (excluded middle)
8. My cup of water is my cup of water. (principle of identity)
9. Rene can't be both thirsty and not thirsty at once. (noncontradiction)
10. Either she sings or she's silent—you can't have both! (excluded middle)

Arguments

Identify the premises and conclusions in the following arguments:

1. Reese is a bird. (premise) So, she has wings. (conclusion)
2. All men are mortal. (premise) Socrates is a man. (premise) Therefore, Socrates is mortal. (conclusion)
3. James probably won't be available if he has kickball practice tonight. (premise) But kickball was not cancelled, despite the rain. (premise) So, James probably won't be available tonight. (conclusion)
4. Some dogs are cats. (premise) All dogs are polka-dotted. (premise) So, some cats are polka-dotted. (conclusion)

5. If Austin reads a book, he is going to fall asleep. (premise) Austin is reading a book. So, Austin will fall asleep. (conclusion)
6. Most pigeons are brown. (premise) This is a pigeon. (premise) Therefore, it is probably brown. (conclusion)
7. Everything that begins to exist has a cause. (premise) The universe exists. (premise) Therefore, the universe has a cause. (conclusion)
8. Either the sun is in the sky, or the stars are out. (premise) The sun is not in the sky. (premise) Therefore, the stars are out. (conclusion)
9. I need to stop by the bank today. (premise) But it closes at five, (premise) and it's already two o'clock. (premise) So, I must head over in the next two hours. (conclusion)
10. If I cook, then I will have food. (premise) If I have food, then I won't be hungry. (premise) Thus, if I cook, I won't be hungry. (conclusion)

Show Me the Argument

Supply the missing premise in the following enthymemes:

1. The kitchen is dirty. Emma's chore is to clean the kitchen. So, Emma hasn't done her chore.
2. The puppy is whining at his dog bowl. The puppy always whines at his dog bowl when he is hungry. Therefore, the puppy must be hungry.
3. If I do my homework, I will pass this class. My goal is to pass this class. So, I should do my homework.
4. It's cold outside. A sweater provides better protection from the cold than a T-shirt. So, I should wear a sweater rather than a T-shirt.
5. Legolas is an elf. Elves are quick and nimble. So, he is quick and nimble.

Identify the premise(s) and **conclusion** of each of the following arguments:

1. I really don't like Abraham Lincoln. He was a terrible guy! See, socialists are the only people who impose income taxes, and he was the first president to impose income taxes. Did you know that? **So, Abraham Lincoln must have been a socialist**.
2. There are a number of interesting historical arguments for Christ's divinity. One famous argument proposes three options: Jesus was either a liar, a lunatic, or the Lord. We can see that he wasn't a liar; he would have had to have been a beast of the worst kind to claim that he was God, and Jesus was obviously a very good guy. But was he a lunatic? There are nice lunatics, after all. Well, Jesus didn't act like a lunatic; he actually acted like an extremely rational person. So, if he was not a liar, and he was not a lunatic, then **Jesus must have been the Lord**.
3. Megan can only win this game of chess if she's lucky. After all, her opponent is a really sharp player. But luck doesn't actually exist. So, **Megan can't win this game.**
4. **Telling a lie is never morally permissible**. And I believe it, because of a story I heard about Corrie ten Boom's niece. Apparently, Cocky told the truth, even though Nazis were after her brothers! So, if even she told the truth in the hardest circumstances, it must never be okay to lie. And, you know, she wasn't just anyone; the ten Boom family were some of the best moral exemplars we can learn from.

5. **Under the worldview of naturalism, naturalism itself cannot be a rational belief**. See, naturalism purports to be a rational belief about the world. But, <u>under the worldview of naturalism, only cause-and-effect relationships exist</u>. This is a problem because <u>rational belief only exists if there are logical connections between reasons and conclusions</u>, and <u>cause-and-effect relationships are not logical connections</u>.

Logical Relevance

State whether the following premises are logically relevant to the conclusion. If they are logically relevant, also note if the premises falsify, make likely, or entail the conclusion.

1. Premise: I hear sprinklers outside. Conclusion: The vegetable garden is being watered. (Relevant, makes likely)
2. Premise: Plato was Aristotle's teacher. Conclusion: Aristotle was Plato's student. (Relevant, entails)
3. Premise: My water bottle is empty. Conclusion: I should take a sip from it. (Relevant, falsifies)
4. Premise: A pilot is traveling faster than the speed of sound. Conclusion: He is traveling at the speed of light. (Irrelevant)
5. Premise: Matt is a man. Conclusion: Therefore, he is a rational animal. (Relevant, entails)
6. Premise: James is calling Emily on the phone. Conclusion: He must want to talk to her. (Relevant, makes likely)
7. Premise: 1+1=2. Conclusion: The sky is blue. (Irrelevant)
8. Premise: TJ's hair is wet. Conclusion: He is completely dry. (Relevant, falsifies)
9. Premise: Mark is Anna's brother. Conclusion: Anna is Mark's sister. (Relevant, entails)
10. Premise: This book has a black cover. Conclusion: Therefore, the author is a woman. (Irrelevant)

Deductive Validity

Identify the following arguments as valid or invalid:

1. Either Mark is wearing blue, or he is wearing green.
   Mark is not wearing green.
   As a result, he is wearing blue. (valid)
2. All bikes have wheels.
   All rollerblades have wheels.
   So, all bikes are rollerblades. (invalid)
3. If the dress is blue, then it is white.
   The dress is not blue.
   Thus, it is not white. (invalid)
4. Everything that began to exist has a cause.
   The universe began to exist.
   Therefore, the universe has a cause. (valid)

5. If an animal is a dog, then it has a tail.
    This animal has a tail.
    Therefore, it is a dog. (invalid)
6. Either I am sitting down, or I am standing up.
    I am standing up.
    Therefore, I am sitting down. (invalid)
7. Some chairs are brown.
    All chairs are places to sit.
    Which means that some places to sit are brown. (valid)

Deductive Soundness

Identify the following valid arguments as sound or unsound:

1. If something is a book, then it doesn't have pages.
    This thing is a book.
    So, it doesn't have pages. (unsound)
2. All dogs are mammals.
    Collies are dogs.
    So, all collies are mammals. (sound)
3. All well-formed arguments are valid arguments.
    Some of the practice problems in this book are well formed.
    So, some of the practice problems in this book are valid. (sound)
4. Either unicorns exist or centaurs are real.
    Centaurs are not real.
    Therefore, unicorns exist. (unsound)
5. All blue things are red things.
    No green things are red things.
    So, no green things are blue things. (unsound)
6. If the sky is dark, the sun is not up.
    The sun is up.
    So, the sky is not dark. (sound)
7. Some cats are not dogs.
    All cats are horses.
    Some horses are not dogs. (unsound)

Nondeductive Standards

Note whether the following arguments deductively entail or nondeductively make likely the truth of their respective conclusions:

1. Jessica almost always drinks coffee with her breakfast.
    Jessica is eating breakfast.
    So, Jessica is drinking coffee. (make likely)
2. All philosophers love wisdom.
    Plato was a philosopher.
    Thus, Plato loved wisdom. (entails)

3. Most students who complete their homework pass this class.
   Grant completed his homework.
   So, Grant will pass this class. (make likely)
4. Most Americans eat turkey on Thanksgiving Day.
   Rebekah is an American.
   So, she will eat turkey on Thanksgiving. (make likely)
5. Either I am wet, or I am dry.
   I am not wet.
   Therefore, I am dry. (entails)
6. C. S. Lewis is the author of *Mere Christianity*.
   The author of *Mere Christianity* is the author of *The Lion, the Witch and the Wardrobe*.
   C. S. Lewis is the author of *The Lion, the Witch and the Wardrobe*. (entails)
7. If Jeff mows the lawn, his mom normally gives him ten dollars.
   Jeff just mowed the lawn.
   So, his mom will give him ten dollars. (make likely)

Nondeductive Strength

Identify whether the following nondeductive arguments are strong or weak:

1. Anne is a good, hardworking student.
   So, she will get an A in logic class. (strong)
2. Emily is Anne's sister.
   So, Emily will get an A in logic class. (weak)
3. John struggles with understanding valid arguments.
   Problem set 22 asks questions about valid arguments.
   Thus, John is going to struggle with answering those questions. (strong)
4. There are more women than men in logic class.
   Thus, the women will have a better overall average grade than the men will. (weak)
5. There are fewer men than women in the class.
   Therefore, the men will have a better overall average grade than the women will.
   (weak)
6. The person who had the best grade on the first exam will probably have the best grade
   on the final exam.
   James wishes he had the best grade on the first exam.
   Thus, James will have the best grade on the final exam. (weak)
7. The person who had the best grade on the first exam will probably have the best grade
   on the final exam.
   Jessica had the best grade on the first exam.
   So, Jessica will have the best grade on the final exam. (strong)

Nondeductive Cogency

Identify whether the following strong arguments are cogent.

1. Planted seeds normally sprout.
   So, if I plant seeds, they will sprout. (cogent)

2. Most birds can't fly.
   A dodo is a bird.
   Therefore, it can't fly. (uncogent)
3. When someone flips a light switch in a dark room, the light will turn.
   So, if I flip a light switch in a dark room, the light will turn on. (cogent)
4. Comedic plays are supposed to make people laugh.
   Romeo and Juliet is Shakespeare's greatest comedic play
   Therefore, if I go see it, I will find it very funny. (uncogent)
5. Prince Charles is the firstborn child of Queen Elizabeth II.
   The firstborn child of a reigning monarch typically becomes the next monarch.
   Thus, Prince Charles will be the next monarch of England. (cogent)
6. Most students who don't do their homework earn straight As.
   So, if you don't do your homework, get ready for an A. (uncogent)
7. Most days, it rains in the rainforest.
   So, if you spend a day in the rainforest, you will experience rain. (cogent)

Chapter 6

Test for Validity

Use the three-step process to test for validity. Are the following arguments valid or invalid?

1. If Charles goes swimming, Charlotte will jump in with him.
    Charles is going swimming.
    So, Charlotte will jump in with him. (valid)
2. Either Charlotte will jump in the lake, or Charity will pick the water lilies.
    Charity is picking water lilies.
    Which means that Charlotte just jumped in. (invalid)
3. Only the girls are picking water lilies.
    Charlie is picking water lilies.
    In other words, Charlie is a girl. (valid)
4. Charlotte either goes by Charlotte or Charlie.
    Chelsey calls her Charlotte.
    So, Chelsey calls her Charlie. (invalid)
5. Either the boys are fishing, or the girls are playing catch.
    The girls are picking water lilies; they're not playing catch.
    Hence, the boys are fishing. (valid)
6. If Chad throws in a fishing lure, he will catch a fish.
    Chad caught a fish.
    Accordingly, he must have thrown in a lure. (invalid)
7. If Christopher throws in his bait, he will catch a bass.
    Christopher did not throw in his bait.
    As a result, he did not catch a bass. (invalid)
8. If the outing ends early, then nobody had fun.
    Everyone had fun.
    So, the outing did not end early. (valid)
9. Either the group can head home at 4:00 p.m. for dinner, or they can stay and watch the sunset.
    They did not head home at 4:00 pm.
    Hence, they stayed to watch the sunset. (valid)
10. If everyone carpooled home from the meadow, then Charity and Charlotte rode together.
    Charity and Charlotte rode together.
    Which means that everyone carpooled home from the meadow. (invalid)

Symbolization

Symbolize the following arguments:

1. If your dog is the size of a house, then he has a house-sized doghouse.
    If he has a house-sized doghouse, then he will be inside.
    In other words, if your dog is the size of a house, he will be inside.

    If D, then H

    If H, then I
    Therefore, if D then I.

2. Either the armies will charge, or a minotaur will take over the country.
    A minotaur will take over the country.
    Thus, the armies will charge.

    Either A or M

    M
    Therefore, A

3. If pigs fly, then the sun is up.
    Pigs fly.
    So, the sun is up.

    If P, then S
    P
    Therefore, S

4. Either pears are purple, or roses are red.
    Pears are not purple.
    Thus, roses are red.

    Either P or R
    Not P
    Therefore, R

5. If faeries exist, then fauns will dance with dwarves and men.
    Fauns will dance with dwarves and men.
    So, faeries exist.

    If F, then D
    D
    Therefore, F

6. If apples are red, then oranges are yellow.
    Apples are red.
    Therefore, oranges are yellow.

    If A, then O
    A
    Therefore, O

7. If we have vanilla, I will make a London fog.
    We do not have vanilla.
    Thus, I will not make a London fog.

    If V, then L
    Not V
    Therefore, L

8. Either cats are cold, or birds are blue.
    Cats are not cold.
    Thus, birds are blue.

    C or B
    Not C
    Therefore, B

9. If the dwarves are noisy, then our enemies can hear us.
    The dwarves are noisy.
    So, our enemies can hear us.

    If D, then E
    D
    Therefore, E

10. Either the sky is blue, or monkeys can fly.
    Monkeys can't fly.
    In other words, the sky is blue.

    Either S or M
    Not M
    Therefore, S

The Common Argument Test for Validity

Test the following arguments for validity, naming the form where applicable:

1. I will either cook with olive oil or butter.
   I will not cook with olive oil.
   So, I will cook with butter. (valid, disjunctive)
2. If it is light outside, the sun is up.
   It is light outside.
   So, the sun is up. (valid, modus ponens)
3. Vegans never eat meat.
   Rachel is a vegan.
   So, Rachel never eats meat. (valid, universal)
4. If Emily Dickinson wrote this poem, then it is high-quality work.
   This poem is terrible.
   Accordingly, Emily Dickinson did not write it. (valid, modus tollens)
5. If the sky is blue, it's not going to rain.
   The weather report said that there's zero chance of rain today.
   So, the sky is blue. (invalid)
6. If I am going to make dinner, either chicken or ground beef is defrosting on the counter.
   Chicken is not defrosting on the counter.
   Ground beef is not defrosting on the counter.
   So, I am not going to make dinner. (valid, dilemma)
7. If Henry VIII had not divorced Catherine of Aragon, he would not have married Anne Boleyn.
   If Henry VIII had not married Anne Boleyn, she would not have been beheaded.
   Hence, if Henry VIII had not divorced Catherine of Aragon, Anne Boleyn would not have been beheaded. (valid, hypothetical syllogism)
8. If I throw in my fishing line, I will either snag the bottom or catch a turtle.
   I will not snag the bottom.
   I will not catch a turtle.
   So, I must not be throwing in a line. (valid, dilemma)
9. Either Augustine wrote the *Confessions*, or Milton wrote *Paradise Lost*
   Milton wrote *Paradise Lost*
   So, Augustine wrote the *Confessions* (invalid)
10. The founding fathers were smart people.
    George Washington was a founding father.
    Thus, George Washington was a smart person. (valid, universal)

Complex Statements and Connectives

Identify the types of complex statements in the problems that follow:

1. Ruth wants to either go hiking or get coffee. (disjunction)
2. If you like detective novels, you will totally enjoy reading Dorothy Sayers. (conditional)
3. Alex drinks Earl Gray tea if and only if vanilla syrup is added to it. (biconditional)
4. Most kids either love or hate broccoli. (disjunction)
5. No blue things are green things. (negation)
6. Bees and butterflies both have wings. (conjunction)
7. If Shakespeare was alive, he wrote *Hamlet*. (conditional)
8. Good dogs don't bark. (negation)
9. Grace is married to Brad if and only if Brad is married to Grace. (biconditional)
10. Plato and Aristotle were both ancient philosophers. (conjunction)

Chapter 7

Truth Tables

Using truth tables, test for the truth values of the following statements, noting when they are tautologies or contradictions:

1. If P, then Q

P	Q	If P, then Q
T	T	**T**
F	T	**T**
T	F	**F**
F	F	**T**

2. S or P

S	P	S or P
T	T	**T**
F	T	**T**
T	F	**T**
F	F	**F**

3. If P, then (not P or Q)

P	Q	If P, then (not P or Q)		
T	T	**T**	F	T
F	T	**T**	T	T
T	F	**F**	F	F
F	F	**T**	T	T

4. Not (if A, then B)

A	B	Not (if A, then B)	
T	T	**F**	T
F	T	**F**	T
T	F	**T**	F
F	F	**F**	T

5. L and (M and not L) (contradiction)

L	M	L and (M and not L)		
T	T	**F**	F	F
F	T	**F**	T	T
T	F	**F**	F	F
F	F	**F**	F	T

6. G or (not G or C) (tautology)

G	C	G or (not G or C)		
T	T	**T**	F	T
F	T	**T**	T	T
T	F	**T**	F	F
F	F	**T**	T	T

7. (A and B) or (not A and not B)

A	B	(A and B) or (not A and not B)				
T	T	T	**T**	F	F	F
F	T	F	**F**	T	F	F
T	F	F	**F**	F	F	T
F	F	F	**T**	T	T	T

8. Either (if S, then R) or (S and not R) (tautology)

S	R	Either (if S, then R) or (S and not R)			
T	T	T	**T**	F	F
F	T	T	**T**	F	F
T	F	F	**T**	T	T
F	F	T	**T**	F	T

9. If (W or not W), then (X and not X) (contradictory)

W	X	If (W or not W), then (X and not X)				
T	T	T	F	**F**	F	F
F	T	T	T	**F**	F	F
T	F	T	F	**F**	F	T
F	F	T	T	**F**	F	T

10. If (S or P) then Q

S	P	Q	If (S or P), then Q	
T	T	T	T	**T**
F	T	T	T	**T**
T	F	T	T	**T**
F	F	T	F	**T**
T	T	F	T	**F**
F	T	F	T	**F**
T	F	F	T	**F**
F	F	F	F	**T**

Using Truth Tables to Test for Validity

Using the truth table, test the following arguments for validity:

1. If Q, then P
   Not Q
   Therefore, not P (invalid)

Q	P	If Q, then P	Not Q	Therefore, not P
T	T	T	F	F
F	T	**T**	**T**	**F**
T	F	F	F	T
F	F	T	T	T

2. J or K
   J
   Therefore, not K (invalid)

J	K	Either J or K	J	Therefore, not K
T	T	**T**	**T**	**F**
F	T	T	F	F
T	F	T	T	T
F	F	F	F	T

3. G if and only if E
   G or E
   Therefore, E (valid)

G	E	G if and only if E	Either G or E	Therefore, E
T	T	*T*	*T*	*T*
F	T	F	T	T
T	F	F	T	F
F	F	T	F	F

4. L if and only if V
   Not V
   Therefore, not L (valid)

L	V	L if and only if V	Not V	Therefore, not L
T	T	T	F	F
F	T	F	F	T
T	F	F	T	F
F	F	*T*	*T*	*T*

5. H and not G
   If N, then G
   Therefore, not N (valid)

H	G	N	H and not G		If N, then G	Therefore, not N
T	T	T	F	F	T	F
F	T	T	F	F	T	F
T	F	T	*T*	*T*	*T*	*T*
F	F	T	F	T	T	T
T	T	F	F	F	F	F
F	T	F	F	F	F	F
T	F	F	*T*	*T*	*T*	*T*
F	F	F	F	T	T	T

6. A or B
   If B, then G
   Therefore, if not, A then G (valid)

A	B	G	A or B	If B, then G	If not A, then G	
T	T	T	*T*	*T*	F	*T*
F	T	T	*T*	*T*	T	*T*
T	F	T	*T*	*T*	F	*T*
F	F	T	F	T	T	T
T	T	F	T	F	F	T
F	T	F	T	F	T	F
T	F	F	*T*	*T*	F	*T*
F	F	F	F	T	T	F

7. If W, then X
   Either W or Z
   Therefore Z (invalid)

W	X	Z	If W, then X	Either W or Z	Therefore Z
T	T	T	**T**	**T**	**F**
F	T	T	**T**	**T**	**F**
T	F	T	F	T	F
F	F	T	T	T	F
T	T	F	T	T	T
F	T	F	T	F	T
T	F	F	F	T	T
F	F	F	T	F	T

8. A or N
    A and N
    Therefore, N or F (valid)

A	N	F	A or N	A and N	Therefore, N or F
T	T	T	*T*	*T*	*T*
F	T	T	T	F	T
T	F	T	T	F	T
F	F	T	F	F	T
T	T	F	*T*	*T*	*T*
F	T	F	T	F	T
T	F	F	T	F	F
F	F	F	F	F	F

9. Not C
    X and S
    Therefore, S (valid)

C	X	S	Not C	Both X and S	Therefore, S
T	T	T	F	T	T
F	T	T	*T*	*T*	*T*
T	F	T	F	F	T
F	F	T	T	F	T
T	T	F	F	F	F
F	T	F	T	F	F
T	F	F	F	F	F
F	F	F	T	F	F

10. If R, then S
    If S, then T
    Therefore, T (invalid)

R	S	T	If R, then S	If S, then T	Therefore, T
T	T	T	T	T	T
F	T	T	T	T	T
T	F	T	F	T	T
F	F	T	T	T	T
T	T	F	T	F	F
F	T	F	T	F	F
T	F	F	F	T	F
F	F	F	**T**	**T**	**F**

Chapter 8

Sweeping Categorical Claims

Identify whether the following sweeping categorical claims are inclusive or exclusive.

1. No stars are green. (exclusive)
2. All men need work. (inclusive)
3. No angels are mortals. (exclusive)
4. Bumblebees have stingers. (inclusive)
5. Good men have virtues. (inclusive)
6. None of Jane Austen's books were written by Dante. (exclusive)
7. Monkeys have tails. (inclusive)
8. The Grand Canyon is beautiful. (inclusive)
9. Water is not a solid. (exclusive)
10. Lights are not dark. (exclusive)

Particular Categorical Statements

Identify whether the following particular categorical claims are inclusive or exclusive.

1. Some bears are stuffed animals. (inclusive)
2. Some bikes do not work. (exclusive)
3. Some chairs are brown. (inclusive)
4. Some chairs are not brown. (exclusive)
5. Some birds fly. (inclusive)
6. Some leaves are green. (inclusive)
7. Some people aren't nice. (exclusive)
8. Some of the disciples didn't end up becoming apostles. (exclusive)
9. Some clothes are soft. (inclusive)
10. Some water isn't blue. (exclusive)

Symbolizing Categorical Statements

Symbolize problems 1–5 of section 1 and 6–10 of section 2 in standard form.

1. No S are G.
2. All M are N.
3. No A are M.
4. All B are S.
5. All G are V.
6. Some S are G.
7. Some P are not N.
8. Some D are not A.
9. Some C are S.
10. Some W are not B.

Contradictories

Write the contradictories of the following statements:

1. Some maps are blue. (No maps are blue.)
2. All monkeys are brown. (Some monkeys are not brown.)
3. Some ice is not cold. (All ice is cold.)
4. No flowers are six feet tall. (Some flowers are six feet tall.)
5. Some artists are not painters. (All artists are painters.)
6. Some pandas are foxes. (No pandas are foxes.)
7. No shoes are worn on your head. (Some shoes are worn on your head.)

Contraries

Write the contraries of the following statements:

1. All food is tasty. (No food is tasty.)
2. No cars are white. (All cars are white.)
3. All clothes are scratchy. (No clothes are scratchy.)
4. All winters are cold. (No winters are cold.)
5. No hair is curly. (All hair is curly.)

Write the subcontraries of the following statements:

1. Some habits are virtues. (Some habits are not virtues.)
2. Some men are logical. (Some men are not logical.)
3. Some gold does not glitter. (Some gold does glitter.)
4. Some wanderers are not lost. (Some wanderers are lost.)
5. Some logic problems are sound. (Some logic problems are not sound.)

Write the subalterns of the following statements:

1. No coats have hoods. (Some coats do not have hoods.)
2. All bikes have wheels. (Some bikes have wheels.)
3. All faeries have wings. (Some faeries have wings.)
4. No books are magnanimous. (Some books are not magnanimous.)
5. All bagels are sugary. (Some bagels are sugary.)

Diagramming Categorical Logic

Diagram the following universal and particular statements:

1. All original members of the Detection Club were mystery authors.

A.   B.

A.   Original members of the Detection club
B.   Mystery authors

Members   Mystery authors
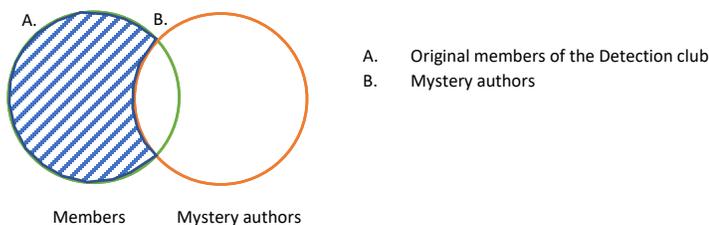
2. Some of the original members of the Detection Club are authors of *The Floating Admiral*.
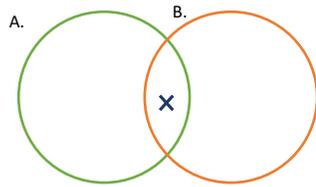
A.   Original members of the Detection club
B.   Authors of *The Floating Admiral*

3. No protagonist of the Detection Club is a detective who solves cases by mumbo-jumbo.
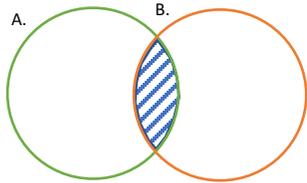
A.   Protagonists of the Detection Club
B.   Detectives who solve cases by mumbo-jumbo

4. All members of the Detection Club are worth reading.
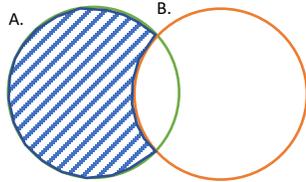
A.   Members of the Detection Club
B.   People who are worth reading

5. Some books written by members of the Detection Club are not books that involve twins.
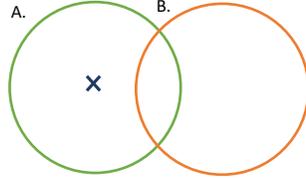
A.   Members of the Detection Club
B.   Books that involve twins

6. No protagonist of the Detection Club is a detective who solves cases by jiggery-pokery.
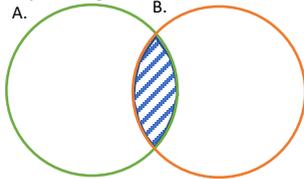
A.   Protagonists of the Detection Club
B.   Detectives who solve cases by jiggery-pokery

7. Some Hercule Poirot novels are books that were written during Agatha Christie's tenure as president of the Detection Club.
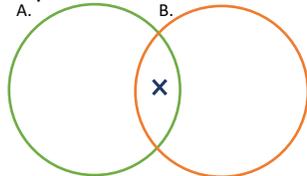
A.   Hercule Poirot novels
B.   Books that were written during Agatha Christie's tenure of the Detection Club

8. Some Lord Peter Wimsey novels were not written during Dorothy Sayers's tenure as president of the Detection Club.
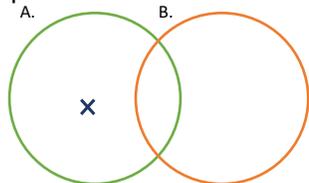
A.   Lord Peter Wimsey novels
B.   Books written during Dorothy Sayers's tenure as president of the Detection Club

9. The entirety of his book on Thomas Aquinas was published during G. K. Chesterton's tenure as president of the Detection Club.
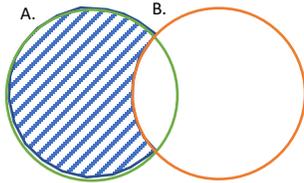
A. The writings of his book on Thomas Aquinas
B. Books published during G.K. Chesterton's tenure as president of the Detection Club

10. No story coming from a member of the detection club is allowed to utilize more than one secret passage.
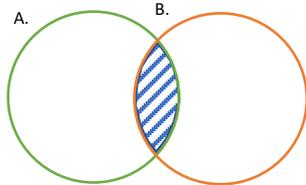

A. Stories coming from members of the Detection Club
B. Stories that utilize more than one secret passage

Representing Two Categorical Statements

Practice diagramming the following sets of categorical statements to test whether the conclusion follows from the given premises:

1. All bikes are orange.
   All tricycles are bikes.
   Conclusion: All tricycles are orange. (valid)
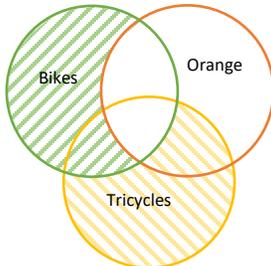
2. No peach trees are blooming.
   All plum trees are blooming.
   Conclusion: No plum trees are peach trees. (valid)
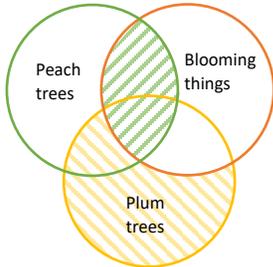
3. Some green things are red things.
    No green things are yellow things.
    Conclusion: Some yellow things are not red things. (invalid)
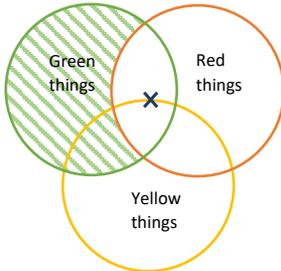
4. Some metals are not pliable.
    All metals are shiny.
   Conclusion: Some shiny things are not pliable. (valid)
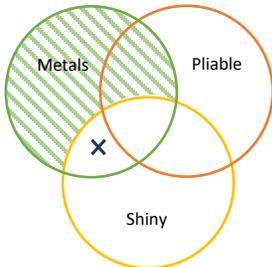
5. All black Labradors are dogs.
    Some Labradors are dogs.
   Conclusion: Some Labradors are black Labradors. (invalid)
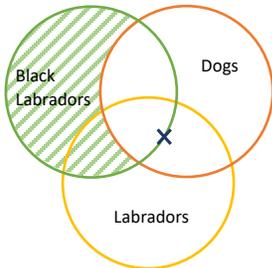
6. No zombies are purple.
    Some purple things are flowers.
   Conclusion: Some flowers are not zombies. (valid)
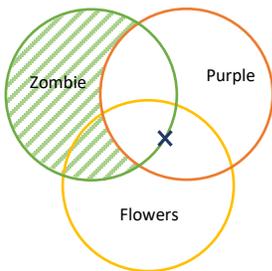
7. No cities are countries.
    All countries are political entities.
    Conclusion: No cities are political entities. (invalid)
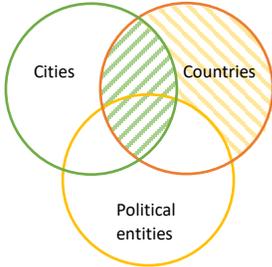
8. All elves are magical creatures.
    No centaurs are elves.
    Conclusion: No centaurs are magical creatures. (invalid)
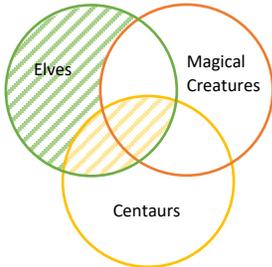
9. Some books are novels.
    All books are composed of words.
    Conclusion: Some things composed of words are novels. (valid)
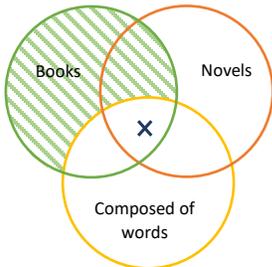
10. No trees are blue.
    Some blue things are birds.
    Conclusion: Some birds are not trees. (valid)
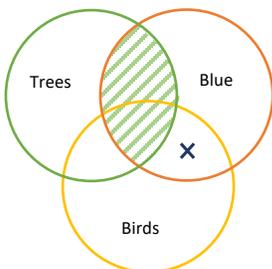
Chapter 9

Determining Strength

Identify whether the following arguments are weak or strong:

1. Yesterday Sara used a blue towel when she got out of the pool.
   So, she'll use a blue one today. (weak)
2. Sara only owns blue towels.
   Sara never borrows towels from other people.
   If we go to the pool today, Sara will use a blue towel to dry off. (strong)
3. Sophie likes most classical music.
   In other words, if you show her some new music, she'll like it. (weak)
4. Sophie plays the guitar.
   So, if you hand her a banjo, she'll know how to play that too. (weak)
5. Sydney gets spicy food every time she goes out to eat.
   Thus, if she goes out to eat later today, she'll probably be ordering spicy food. (strong)
6. Sydney likes to cook with bell peppers.
   My conclusion? Her food must be really spicy. (weak)
7. Susannah has really good taste in tea.
   Annie likes good tea.
   So, if Susannah offers Annie some tea, she will like it. (strong)
8. Susannah eats dark chocolate nearly every day.
   Susannah drinks tea nearly every day.
   Hence, I think Susannah must drink tea with her chocolate all the time. (weak)
9. Annie's room is always clean.
   That shows she is a neat freak. (strong)
10. Annie never seems to get to bed early.
    She's been up past midnight every day this month!
    So, I think its safe to say that she'll stay up past midnight tonight as well. (strong)

Cogency

Identify whether the following problems are cogent or uncogent:

1. The sun has gone down every day for the past two centuries.
   So, the sun will go down every day for the rest of the year. (cogent)
2. Every time it has been tested, water at sea level boils at 212 degrees Fahrenheit.
   If someone heats up water at sea level, it will boil when it hits 212 degrees. (cogent)
3. Most birds can fly.
   A beaver is a bird.
   So, it can fly too. (uncogent)
4. Most bees have stingers.
   A drone is a bee.
   Therefore, it has a stinger. (cogent)

5. Most presidents of the United States have not served more than two terms.
   Franklin G. Roosevelt was a president of the United States.
   So, he did not serve more than two terms. (uncogent)
6. Most nights the moon is not visible in the sky.
   So, the moon will probably not be visible tonight. (uncogent)
7. Most light bulbs turn on when properly connected to electricity.
   So, if you properly connect a broken lightbulb to electricity, it will turn on. (cogent)
8. Most mammals give birth to their young.
   A platypus is a not a mammal.
   Therefore, a platypus does not give birth to its young. (uncogent)
9. Most dogs are born with tails.
   Corgis are dogs.
   Therefore, Corgis are born with tails. (cogent)
10. The majority of eggs eaten in the US are chicken eggs.
    So, if you eat an egg in the US, it will probably be a chicken egg. (cogent)

Chapter 10

How to Reason Abductively

Given the evidence listed, pick the best explanation.

1. Ann walks into her apartment looking tired and sweaty with gym clothes on. Did she:
    a. change into gym clothes before driving to and from class?
    b. just get back from working out?
    c. decide to sunbathe in the park and accidentally fell asleep?
    d. not sleep very well last night, and the neighbor's kids sprayed her with a water gun while she walked downstairs to check the mail?
2. Baseball practice started five minutes ago and John, who is habitually tardy, hasn't arrived yet. Was he:
    a. kidnapped by the local tramp but also decided to go along with the man because he thought it would be fun?
    b. stuck behind a terrible wreck on the freeway?
    c. asked by his mom to come home because she is sick with chickenpox and needed soup?
    d. distracted on his way to practice?
3. Your dog comes in covered in mud. Did:
    a. a delinquent neighborhood kid decide to pummel him with water balloons full of mud?
    b. he accidentally start a mudslide on the local hill?
    c. he find a puddle to play in after a rainstorm?
    d. he take a trip to the local spa?
4. Megan's watercolor pencils are on her desk when she gets home from work. Did:
    a. her roommate borrow the pencils and return them to her desk rather than putting them in their proper place?
    b. her dog get the pencils out of the cabinet she stores them in and put them on her desk?
    c. the neighbors' kids slam into their shared wall while tussling with so much force that the pencils fell out of the cabinet onto her desk?
    d. her action figurines come to life and have a sketching session, leaving the pencils on the desk because they nearly got caught in the act?
5. Rebekah sniffs a shirt as she pulls it out of her closet and decides it smell bad. Did:
    a. an angry neighbor sneak in and spray her clothes with perfume?
    b. small animals get into her closet and make a nest in the shirt?
    c. she pull it out of her dirty laundry basket because she wanted to put it in the washing machine?
    d. it sit in her closet so long that it started to smell musty but only sat in the closet for a day?

6. When Jessica went to the oven to check on the chicken she was cooking for dinner, she found it was burned. Did:
    a. a small animal get into her house and accidentally turn the temperature up?
    b. her husband attack the oven with a ray gun as part of his latest adventures as an aspiring inventor?
    c. a thief sneak in and replace her well-cooked meal with a burnt one without stealing anything?
    d. she misread the recipe she was following and set the oven to 425 instead of 325?

7. Ruth comes into her living room to find her favorite vase smashed on the floor. Did:
    a. her cat accidentally brush against it while walking on the counter?
    b. a vindictive ex-boyfriend break in intending to destroy exactly that vase?
    c. a gust of wind blow so hard through the broken window that the vase toppled over?
    d. the house of cards she was building fall over next to it?

8. The balloons you set up as décor for last night's birthday party are all deflated in the morning. Did:
    a. one of your guest sneak back in with a BB gun to have a game of target practice?
    b. you fail to tie the balloons properly?
    c. the neighborhood cat decide to try his claws out on the colorful little bouncy things he found hanging up?
    d. an alien sneak in with his favorite knife to commit an act of mass murder and confuse balloons for people?

9. Julie's fiddle-leaf fig died over the course of the last week. Did:
    a. her pet parrot chew away at its roots every night while she was asleep?
    b. a guest poison the plant while visiting five days ago?
    c. she overwater it?
    d. her roommate decide to chop it in half in a fit of rage, but its trunk is still intact?

10. All the chocolate has disappeared from your secret stash. Did:
    a. you eat it all in a sleep-walking sugar craze?
    b. ants find it?
    c. your trusty friends take your declaration of intent to diet next week a little too seriously and stow it all away?
    d. it turn out that your secret stash wasn't so secret after all: your significant other ate the last two chocolate bars last week?

Theoretical Virtues

Looking back at the problems in the previous section, use the theoretical virtues to explain why the answer you chose is the best one. Also, pick one incorrect option from each problem and list which theoretical virtues it fails to exhibit.

Answers will vary.

Chapter 12

Formal Fallacies

Identify the form of the following valid and fallacious arguments:

1. If Jones connects with the ball, he will hit a home run.
    Jones did not hit a home run.
    So, Jones did not connect with the ball. (modus tollens)
2. Smith will either tackle Brown, or Brown will not be given a free kick.
    Smith will tackle Brown.
    Thus, Brown will be given a free kick. (affirming the disjunct)
3. If Sara is better than Mark at ping-pong, she will win the game.
    Sara is not better than Mark at ping-pong.
    Therefore, she will not win the game. (denying the antecedent)
4. If Ben goes on a hike, Anne will go on a hike.
    Anne will go on a hike.
    So, Ben will go on a hike. (affirming the consequent)
5. If Nate makes the right move, Jen will lose the foosball game.
    Nate made the right move.
    Thus, Jen will lose the game. (modus ponens)
6. Either Keith will make the basket, or Jordan will steal the ball.
    Keith will not make the basket.
    Therefore, Jordan will steal the ball. (disjunctive syllogism)
7. If Edward does not parry his blade, John will score a point.
    John will not score a point.
    Therefore, Edward will parry his blade. (modus tollens)
8. If Emma is not careful, Seth will hit the birdie slyly over the badminton net.
    Emma will be careful.
    So, Seth will not hit the birdie slyly over the badminton net. (denying the antecedent)
9. If Jessica sets the ball right, Hannah will make it over the net.
    Hannah will make it over the net.
    Thus, Jessica will set the ball right. (affirming the consequent)
10. Either Sophia will draw a hopscotch square or Anna will not have fun today.
    Sophia will draw a hopscotch square.
    So, Anna will have fun today. (affirming the disjunct)

Fallacies of Irrelevance

Identify the following fallacies:

1. Brad says that pandas are not real.
    But Brad doesn't like chocolate ice cream, and all people who dislike chocolate ice cream are silly.
    So, pandas must be real. (ad hominem)

2. Make sure to stop by and adopt a puppy—just look at how cute they are wagging their tails! (appeal to emotion)
3. George is super annoying, so if he was the one who told you that Anna is a painter, don't believe it. (genetic)
4. Look, there is no evidence that humans were created ex nihilo. Thus, humans were not created out of nothing. (argument from silence)
5. Atheists think there is no such thing as morality and, thus, they must think it doesn't matter how you live your life. But that's just accepting immorality. Therefore, atheism is a false view. (strawman)
6. Mom: Anna, make sure that you vacuum your bedroom at some point today.
   Anna: Sorry, I can't! I'm going to be busy all day and won't get back till dinner time. (red herring)
7. Make sure to eat all of your veggies. The boogie monster will get you if you don't! (appeal to emotion)
8. Aaron's mom told him that it is important to keep his room clean.
   But his mom's room is the dirtiest in the house.
   So, it must not really matter if he keeps his room clean. (tu quoque)
9. This thing is an orange.
   All orange things taste good.
   So, this orange must taste good. (equivocation)
10. Miss Brown says that I should read more books because they will be good for me.
    But Miss Brown is a teacher, and teachers always say things like that.
    So, I don't need to read more books. (ad hominem)
11. There is no way Jones tried to bribe his professor for a better grade; good students never do that sort of thing. (no true Scotsman)
12. Gardner: Make sure that you give that rose bush plenty of sunshine and enough water.
    Homeowner: Well, it's been pruned just right, so we should be good! (red herring)
13. God created the world, and carpenters are creators too. So, carpenters must be gods! (false equivalence)
14. So far, two pink gumballs and five red gumballs have come out of the machine. So, a pink one will come out next. (gambler's fallacy)
15. Bridgett must like tea; no Englishman could ever despise the stuff. (no true Scotsman)
16. Susan doesn't like the taste of this dish.
    But her taste in music is terrible.
    So, she must be misjudging. (equivocation)
17. Mr. Carter told me that I shouldn't use the chop saw in his shop.
    But he uses it all the time!
    So, it must not actually be bad for me to use it. (tu quoque)
18. Apples are fruit, and pineapples are fruit. Apples taste amazing, so pineapples must too. (false equivalence)
19. Megan has had so much bad luck this year that I bet things around her are about to turn for the better! (gambler's fallacy)
20. After I stepped on a sidewalk crack, it started to rain. So, stepping on the crack must have caused my bad luck. (post hoc, ergo propter hoc)

21. Mayor Jones says that the city needs to raise taxes to avoid going into debt. But Mayor Jones is a communist, and they always want to raise taxes for no good reason. So, the city doesn't need to raise taxes to avoid going into debt. (ad hominem)

22. There is no evidence that Joel stole the book from Brad. So, Joel didn't steal it. (argument from silence)

23. Sam, that dog over there, has a lot of hair, four limbs, and a tail. That guy Matt also has a lot of hair and four limbs. So, Matt must have a tail. (false equivalence)

24. All right kids! Line up next to the door. You know it always makes Miss Sara smile when you do! (appeal to emotion)

25. Julie says that cutting off too many leaves while pruning is bad for houseplants. But I've seen the pile of leaves she just took off of her ivy vine—it was huge! So, taking off a lot of leaves must not really be a problem. (tu quoque)

26. Professor: You should set aside some sacred time for your studies
    Student: But I really don't like the topic we're covering in class! (red herring)

27. Christians say that gods don't exist. So, it must be the case that their god doesn't exist. (equivocation)

28. The goalkeeper has saved three penalty kicks in a row. So, he will definitely save this next one too. (gambler's fallacy)

29. After I ate some veggies, my stomach started to hurt. I bet the asparagus did it. (post hoc, ergo propter hoc)

30. There is no evidence that aliens brought human beings to earth, so aliens did not bring humans beings to earth. (argument from silence)

Fallacies of Inadequate Support

Identify the following fallacies:

1. Parent: Either you eat all of your food or none of it.
   Jessica takes a bite.
   Parent: All right—that means you have to eat it all. (false dilemma)

2. Be careful hanging out with Ann. If you let her in the club, all seven of her sisters are going to want to join too. (slippery slope)

3. The world is flat; it looks and feels that way every day. (confirmation bias)

4. Matt: Have you stopped holding to the ridiculous theory that God created the world?
   Joan: No, I haven't.
   Matt: Well, you should, since you just agreed it is ridiculous. (complex question)

5. No, you can't teach Mark how to use a knife. If he even touches one, he will cut himself so bad that he will need to be taken to the hospital. (slippery slope)

6. I couldn't find my logic homework.
   My dog must have eaten it. (ad hoc)

7. This tea kettle is made of metal, so its handle is made of metal too. (division)

8. Dogs are better than cats. At least, that's what Mr. Peters says, and he is a world-renowned zoologist. So, it must be true. (appeal to authority)

9. Yes, Officer, I do think you should give people tickets for running a stop sign, but I don't deserve one because I am new to the area and didn't see it. (special pleading)
10. This cake has salt and salted butter in it, so it must be salty. (composition)
11. You should order the latest phone. Everyone's doing it. (bandwagon)
12. But, Mom, you said it was ok for me to sip from your cup! So, I did a couple of times. You shouldn't be mad that I finished it. (fallacy of the beard)
13. You can either hate me and correct me or love me and let me do what I want—there is no other option.
    You don't let me do what I want.
    So, you hate me! (false dilemma)
14. This soup tastes really bad.
    A thief must've snuck into the house while it was simmering and added something to it. (ad hoc)
15. If you don't do your homework today, you'll end up failing the class and flunking out of college! (slippery slope)
16. Rudolf's nose is red, so Rudolf is a red reindeer. (composition)
17. I have known seven parrots personally, all of whom loved to be scratched on the head. So, parrots love to be scratched on the head. (hasty generalization)
18. Everyone who matters has signed up for a campus club. You should too. (bandwagon)
19. We Christians believe that the Bible is divinely inspired. Why? Because it says so in 2 Timothy. (begging the question)
20. Sara: Have you stopped listening to that modern hip-hop trash?
    Anne: Nope!
    Sara: Well, seeing as how you just agreed that it is trash, you need to stop listening to hip-hop. (complex question)
21. Yes, of course I think that kids should get in trouble for slapping their classmates. But Bobby is a good kid, so I don't think you should punish my son. (special pleading)
22. Both of the succulents Mark owned died rather quickly. So, succulents must be easy to kill. (hasty generalization)
23. If you set aside five dollars to spend out of your savings, you will not deplete them. So, take out as much as you want: it's just five dollars on repeat, so your account will never run dry. (fallacy of the beard)
24. Aaron can choose to be a girl if he wants to be. Gender is a choice, after all. (begging the question)
25. Tulips are the world's prettiest flowers. A lot of well-respected florists, including Ms. Meadows, say so. (appeal to authority)
26. Students who fail to turn their homework in on time should fail this assignment. My homework should be accepted for this assignment even though it is late. A zero on this assignment will make me fail the class, and that is not an option. (special pleading)
27. This stuffed animal is fuzzy and soft, so its plastic eye must be fuzzy and soft too. (division)
28. A person is either alive and well or dead and gone.
    The Apostle Paul is not alive.
    So, he is completely gone—he no longer exists. (false dilemma)

29. Apples taste better than pears. Why? Because John Jones is a professional chef, and he says so. (appeal to authority)
30. Megan says that she doesn't like wearing a seatbelt. Why? Because Aaron survived a car crash thanks to not wearing his seatbelt. So, Megan thinks that not wearing a seatbelt in the car is a good idea. (confirmation bias)