Chapter 3

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1 Questions

1. Write two atomic (or basic or simple) propositions about science.

2. Write two complex propositions about politics.

3. Draw a truth table for one of your complex propositions about politics.

4. Write two propositions about popular culture that use *or*.

5. Did your above propositions both use the incusive *or*? If so, good. Now write two that use the exclusive *or-but-not-both*.

2 Some truth tables

1.

A	B	A and B
T	T	
T	F	
F	T	
F	F	

2.

A	B	C	A and B	(A and B) or C
T	T	T		
T	F	T		
F	T	T		
F	F	T		
T	T	F		
T	F	F		
F	T	F		
F	F	F		

3.

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

4.

A	B	C	A and B	B or C	(A and B) or (B or C) BNB
T	T	T			
T	F	T			
F	T	T			
F	F	T			
T	T	F			
T	F	F			
F	T	F			
F	F	F			

5.

A	B	C	A or B BNB	B & C	not-(B & C)	(A or B BNB) or not-(B & C)
T	T	T				
T	F	T				
F	T	T				
F	F	T				
T	T	F				
T	F	F				
F	T	F				
F	F	F				

6.

A	B	C	A or B	B or C	not-(B or C)	(A or B) or not-(B or C) BNB
T	T	T				
T	F	T				
F	T	T				
F	F	T				
T	T	F				
T	F	F				
F	T	F				
F	F	F				

7.

A	B	C	((A & B) or (A & not-C)) or (not-B & not-C)
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	

3 If, then, and only if

1. If it is raining, I'll take an umbrella.
2. If today is a class day, I'll be in class.
3. I'll be in class only if today is a class day.
4. Only if you are 18 can you see an R movie.
5. You can only pay in-state tuition if you live in-state.
6. There are easy ways to be rich, if you have no scruples.
7. You can't get to Washington unless you go through Virginia.
8. Unless you answer three questions, you can't pass this bridge.
9. You can pass this bridge if you answer three questions.
10.
11.

4 Truth tables with conditionals

1.

A	B	If A, then not B
T	T	
T	F	
F	T	
F	F	

2.

A	B	C	If (A or B), then B or C BNB
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	

3.

A	B	C	If (A only if C), then B
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	

4.

A	B	C	(A if and only if B) or (B & C) BNB
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	

5 Immediate inferences

1. Write two examples that are straightforward and obvious to you.
2. Write a truth table to prove that the argument form is valid.
3. Write to examples, in standard form, that are similar, but not identical, to the argument in question. Identify how they differ from the argument in question. Draw a truth table for each to prove if they are valid or invalid.
4. Write a more complicated example.

5.1 The imediate inferences

- Conversion:

  1. 1. If A, then B.

  ∴ If not B, then not A.

- Double Negation:

  1. A.

  ∴ Not not A.

- De Morgan's Laws (there are two!):

  1. Not (A and B)

  ∴ Not A or Not B.

  1. Not (A or B)

  ∴ Not A and Not B.

6 Multi-premise inferences

1. Write two examples that are straightforward and obvious to you.
2. Write a truth table to prove that the argument form is valid.
3. Write to examples, in standard form, that are similar, but not identical, to the argument in question. Identify how they differ from the argument in question. Draw a truth table for each to prove if they are valid or invalid.
4. Write a more complicated example.

6.1 Some multi-premise inferences

- Modus Ponens:
    1. If A, then B.
    2. A.
    ∴ B.
- Modus Tollens:
    1. If A, then B.
    2. Not B.
    ∴ Not A.
- Conditional (or Hypothetical) Syllogism:
    1. If A, then B.
    2. If B, then C.
    ∴ If A, then C.
- Alternative Syllogism:
    1. A or B.
    2. Not A.
    ∴ B.
- Disjunctive Syllogism:
    1. Not both A and B. (i.e., Not (A and B))
    2. A.
    ∴ Not B.

7 Enthymemes at work

1. (a) Susan sold the most cars last quarter.
   (b)
   ∴ Susan will get a bonus.
2. (a) You can see the movie only if you are 18.
   (b)
   ∴ You are 18.
3. (a) There aren't any people here.
   (b)
   ∴ No one likes me.
4. (a) The cat is not mine.
   (b)
   ∴ The cat is my brother's.
5. (a) If everyone at the store bought a phone, we all got one free.
   (b) We didn't get a free phone.
   ∴
6. (a) You can't be both here and in the other room.
   (b)
   ∴ You aren't in the other room.
7. (a) You won the golf round only if you got the lowest score.
   (b)
   ∴ You won the golf round then you missed the water hazards around the green.
8. (a) The shirt is not clean.
   (b)
   ∴ I cannot wear the shirt.

8 Valid?

1. You can ride the ride at the theme park only if you are 48 inches tall. Since Jenny is still young, she is not 48 inches tall. (She is only 40 inches tall!) So Jenny could not ride the ride.

2. If Melissa trains for the marathon using the schedule provided, she'll be able to finish the race in 4 hours. But Melissa did not train for the marathon using the schedule provided. So, unfortunately, Melissa will not be able to finish in 4 hours.

3. It is very cold outside today. If it is cold and rainy, I don't like to go outside. So I won't like to go outside today.

4. If seventy-three percent of people in the United States like white or milk chocolate, then chocolate should be our national food. If chocolate should be our national food, then chocolate milk should be our national beverage. If seventy-three percent of people in the United States like white or milk chocolate, then chocolate milk should be our national beverage.

5. Only if you buy a ticket can you win the lottery. I bought a ticket for the lottery. So I can win.

6. We should only believe that 'being a person' is an essential property of persons if it turns out that composition is restricted—that sometime objects *do not* compose a further object. But, as the Vagueness Argument shows, composition is not restricted. So 'being a person' must not be an essential property after all.

7. There are not any reasons to use that bad computer. If there are reasons to use that computer, then you should use it. So you should not use that computer.

9 Truth tables

1. (a) If A, then not B.

   (b) B.

   ∴ Not A.

A	B	
T	T	
T	F	
F	T	
F	F	

2. (a) Not both A and B

   (b) If C, then not A or not B.

   ∴ Not C.

A	B	C	
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	

3. (a) Not (A and B and C).

   (b) A.

   ∴ Not B and not C.

A	B	C	
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	

4. (a) Not (B and C)

   (b) If A, then B.

   ∴ Not A.

A	B	C	
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	

5. (a) Not (A or B)

   (b) B or C.

   ∴ C.

A	B	C	
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	

6. (a) If A and B, then C.

   (b) If C, then A.

   ∴ If A and B, then A.

A	B	C	
T	T	T	
T	F	T	
F	T	T	
F	F	T	
T	T	F	
T	F	F	
F	T	F	
F	F	F	