

CRITICAL THINKING

Problem Set #12: Inferences with Categorical Statements

Although I strongly suggest that you write out answers to all these problems, you do not have to turn in any written responses. You do, however, need to be prepared to do these types of problems, for questions on the weekly quizzes and exams will primarily be drawn from the problem sets. The solutions to these problems will be provided, so you can check your own work and seek help from me as necessary.

We will devote considerable time to these types of problems during the next in-class workshop. In order to make that workshop productive, please make a solid start on them. That way you can use the workshop to address the difficulties you are facing.

I have included an advanced logic puzzle for your own entertainment.

Part A Instructions / Problems

Assume that the following categorical statement is *true*:

All successful executives are intelligent people.

Draw the Venn diagram representing this statement, being sure to label its subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.)

Now given the truth of that Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. No successful executives are intelligent people.
2. Some successful executives are intelligent people.
3. Some successful executives are not intelligent people.

Part B Instructions / Problems

Assume that the following categorical statement is *false*:

All successful executives are intelligent people.

Since this is false, draw the Venn diagram representing what is actually true, being sure to label the subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.) Your Venn diagram from Part A may help you here.

Now given the truth of this new Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. No successful executives are intelligent people.
2. Some successful executives are intelligent people.
3. Some successful executives are not intelligent people.

Part C Instructions / Problems

Assume that the following categorical statement is *true*:

No animals with horns are carnivores.

Draw the Venn diagram representing this statement, being sure to label its subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.)

Now given the truth of that Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. Some animals with horns are carnivores.
2. Some animals with horns are not carnivores.
3. All animals with horns are carnivores.

Part D Instructions / Problems

Assume that the following categorical statement is *false*:

No animals with horns are carnivores.

Since this is false, draw the Venn diagram representing what is actually true, being sure to label the subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.) Your Venn diagram from Part C may help you here.

Now given the truth of this new Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. Some animals with horns are carnivores.
2. Some animals with horns are not carnivores.
3. All animals with horns are carnivores.

Part E Instructions / Problems

Assume that the following categorical statement is *true*:

Some uranium isotopes are highly unstable substances.

Draw the Venn diagram representing this statement, being sure to label its subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.)

Now given the truth of that Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. Some uranium isotopes are not highly unstable substances.
2. All uranium isotopes are highly unstable substances.
3. No uranium isotopes are highly unstable substances.

Problem Set #12: Inferences with Categorical Statements (Continued)

Part F Instructions / Problems

Assume that the following categorical statement is *false*:

Some uranium isotopes are highly unstable substances.

Since this is false, draw the Venn diagram representing what is actually true, being sure to label the subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.) Your Venn diagram from Part E may help you here.

Now given the truth of this new Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. Some uranium isotopes are not highly unstable substances.
2. All uranium isotopes are highly unstable substances.
3. No uranium isotopes are highly unstable substances.

Part G Instructions / Problems

Assume that the following categorical statement is *true*:

Some college professors are not entertaining lecturers.

Draw the Venn diagram representing this statement, being sure to label its subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.)

Now given the truth of that Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. All college professors are entertaining lecturers.
2. No college professors are entertaining lecturers.
3. Some college professors are entertaining lecturers.

Part H Instructions / Problems

Assume that the following categorical statement is *false*:

Some college professors are not entertaining lecturers.

Since this is false, draw the Venn diagram representing what is actually true, being sure to label the subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.) Your Venn diagram from Part G may help you here.

Now given the truth of this new Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. All college professors are entertaining lecturers.
2. No college professors are entertaining lecturers.
3. Some college professors are entertaining lecturers.

Part I Instructions / Problems

Assume that the following categorical statement is *true*:

All socialists are pacifists.

Draw the Venn diagram representing this statement, being sure to label its subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.)

Now given the truth of that Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. Some non-pacifists are not non-socialists.
2. No socialists are non-pacifists.
3. All non-socialists are non-pacifists.
4. No non-pacifists are socialists.
5. No non-socialists are non-pacifists.
6. All non-pacifists are non-socialists.
7. No pacifists are non-socialists.
8. Some socialists are not pacifists.
9. All pacifists are socialists.
10. Some non-pacifists are socialists.

Part J Instructions / Problems

Assume that the following categorical statement is *true*:

No scientists are philosophers.

Draw the Venn diagram representing this statement, being sure to label its subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.)

Now given the truth of that Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. No non-philosophers are scientists.
2. Some non-philosophers are not non-scientists.
3. All non-scientists are non-philosophers.
4. No scientists are non-philosophers.
5. No non-scientists are non-philosophers.
6. All philosophers are scientists.
7. Some non-philosophers are scientists.
8. All non-philosophers are non-scientists.
9. Some scientists are not philosophers.
10. No philosophers are non-scientists.

Problem Set #12: Inferences with Categorical Statements (Continued)

Part K Instructions / Problems

Assume that the following categorical statement is *true*:

Some saints are martyrs.

Draw the Venn diagram representing this statement, being sure to label its subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.)

Now given the truth of that Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. All saints were martyrs.
2. All saints were non-martyrs.
3. Some martyrs were saints.
4. No saints were martyrs.
5. All martyrs were non-saints.
6. Some non-martyrs were saints.
7. Some saints were not non-martyrs.
8. No martyrs were saints.
9. Some non-saints were martyrs.
10. Some martyrs were non-saints.
11. Some saints were not martyrs.
12. Some martyrs were not saints.
13. No saints were non-martyrs.
14. No non-saints were martyrs.
15. Some martyrs were not non-saints.

Part L Instructions / Problems

Assume that the following categorical statement is *true*:

Some merchants are not pirates.

Draw the Venn diagram representing this statement, being sure to label its subject term (*S*) and predicate term (*P*). (Be sure to put the subject term (*S*) on the left and the predicate term (*P*) on the right.)

Now given the truth of that Venn diagram, what can you infer about each of the categorical statements listed below? That is, is each true, false, or unknown? Use a Venn diagram to justify each of your answers (being sure to keep each statement's subject term on the left and predicate term on the right). You may assume that neither *S* nor *P* is empty.

1. No pirates are merchants.
2. No merchants are non-pirates.
3. Some merchants are non-pirates.
4. All non-merchants are pirates.

5. Some non-merchants are non-pirates.
6. All merchants are pirates.
7. No non-merchants are pirates.
8. No pirates are non-merchants.
9. All non-pirates are non-merchants.
10. Some non-pirates are not non-merchants.
11. Some non-pirates are merchants.
12. No non-pirates are merchants.
13. Some pirates are merchants.
14. No merchants are non-pirates.
15. No merchants are pirates.

Note: There may a lot of exercises here. Do not feel obligated to do all of them. I often assign many exercises so that you have plenty of opportunities to practice the skills these exercises are trying to impart. I suggest doing just enough of them so that you are confident that you could use these skills on a quiz or an exam.

Logic Puzzle

Austin Powers, international man of mystery, was shot, killed, and vaporized with a laser ray gun by a criminal syndicate because he almost had enough evidence to shut it down. After considerable effort on the part of Interpol, five suspects were brought before the lead detective of Scotland Yard, who asked them what they had to say for themselves. Each suspect made three statements, exactly two of which are true and exactly one of which is false. Their statements were:

DR. EVIL: I did not kill Powers. I never owned a laser gun in all my life. The Frau did it.

NUMBER TWO: I am innocent. I never saw Mini Me before. The Frau is guilty.

MINI ME: I did not kill Powers. Fat Man is the guilty one. Number Two and I are old pals.

FAT MAN: I did not kill Powers. I never owned a laser gun. The others are all blaming someone else for the murder.

THE FRAU: I am innocent. Mini Me is the guilty one. Dr. Evil did not tell the truth when he said that I did it.

Question: Who murdered Austin Powers?

This question has a definitive right answer that can be fully justified without any guessing.