

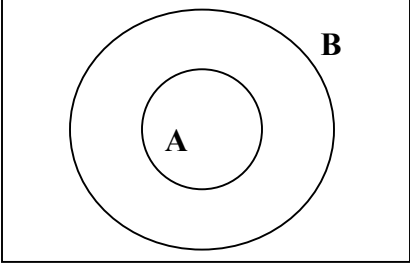
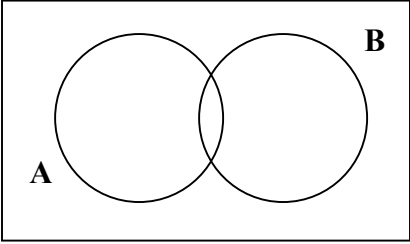
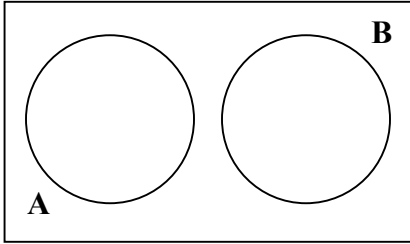
1.5 VALID AND INVALID ARGUMENTS*Textbook Reference Section 3.5, 3.6***CLAST OBJECTIVES**

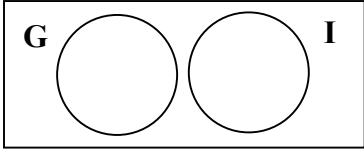
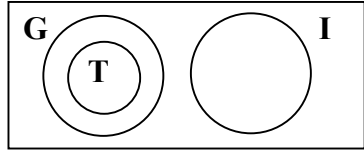
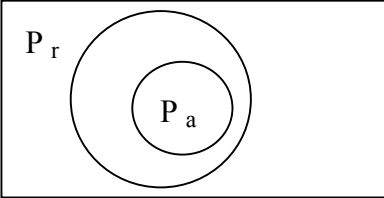
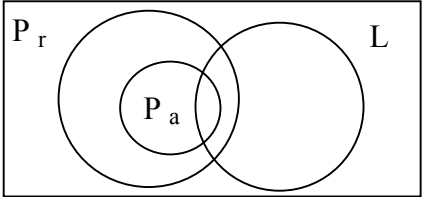
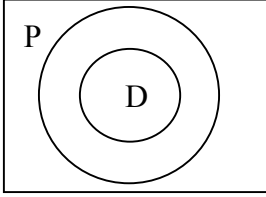
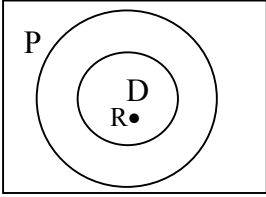
- 📦 **Draw logical conclusions from data**
- 📦 **Draw logical conclusions when facts warrant them**
- 📦 **Recognize invalid arguments with true conclusions**
- 📦 **Recognize valid reasoning patterns shown in everyday language**

An argument is made up of premises and a conclusion. Premises are statements that must be accepted as true. The conclusion given may be invalid or valid. A valid conclusion is logically deduced from the premises and thus the argument is valid.

Case 1: Arguments using universal quantifiers: all , some , none , no.

(Venn Diagrams aid in determining a valid conclusion for these types of arguments.)

| Premise | Diagram |
|------------------------|--|
| All A 's are B 's |  |
| Some A 's are B 's |  |
| No A 's are B 's |  |

| Examples | Solutions |
|---|---|
| <p>a) Given the following:</p> <p>i) No persons who grade work are intelligent.</p> <p>ii) All teachers grade work.</p> <p>Find a valid conclusion.</p> | <p>For premise i, we need two circles: G for grade and I for intelligent.</p>  <p>For premise ii, we add another circle, T, for teachers.</p>  <p>Conclusion: No teacher is intelligent.</p> |
| <p>b) Given the following:</p> <p>i) All parents make promises.</p> <p>ii) Some parents are liars.</p> <p>Find a valid conclusion.</p> | <p>For premise i, we need two circles: P_a for parents and P_r for promises.</p>  <p>For premise ii, we add another circle, L, for liars.</p>  <p>Conclusion: Some people who make promises are liars.</p> |
| <p>c) Given the following:</p> <p>i) All dogs are playful.</p> <p>ii) Rover is a dog.</p> <p>Find a valid conclusion.</p> | <p>For premise i, we need two circles: D for dogs and P for playful.</p>  <p>For premise ii, we need to add a dot, R, for Rover.</p>  <p>Conclusion: Rover is playful.</p> |

Check Your Progress 1.5

For Questions 1 – 6, read each pair of statements and find a valid conclusion, if possible.

1. i) No people who assign work are rich.
 ii) All teachers assign work.

2. i) Some students are happy.
 ii) All happy people are irritating.

3. i) All politicians are liars.
 ii) No liar is intelligent.

4. i) Some dogs have fleas.
 ii) Spot is a dog.

5. i) All horses eat hay.
 ii) Harry eats hay.

6. i) All birds have wings.
 ii) Robin is a bird.

Case 2: Arguments without universal qualifiers.

Five valid argument forms are symbolized below. Arguments outside these will be considered invalid.

Valid Forms

| | |
|--|--|
| 1. i) If p then q ii) <u> p </u> Therefore, q. | 2. i) If p then q ii) <u> not q </u> Therefore, not p. |
| 3. i) p or q ii) <u> not p </u> Therefore, q. | 4. i) p or q ii) <u> not q </u> Therefore, p. |
| 5. i) If p then q ii) <u> If q then r </u> Therefore, if p then r. | |

| Examples | Solutions |
|--|--|
| <p>d) Given the following:</p> <p>i) If you wear a ring, then you are married.</p> <p>ii) You wear a ring.</p> <p>Find a valid conclusion.</p> | <p>i) If p then q</p> <p>ii) <u>p</u></p> <p>Form 1 indicates that the conclusion is q: You are married.</p> |
| <p>e) Given the following:</p> <p>i) You study French or Spanish.</p> <p>ii) You do not study Spanish.</p> <p>Find a valid conclusion.</p> | <p>i) p or q</p> <p>ii) <u>not q</u></p> <p>Form 4 indicates that the conclusion is p: You study French.</p> |
| <p>f) Given the following:</p> <p>i) If you study, you will get a job.</p> <p>ii) If you get a job, you can buy a car.</p> <p>Find a valid conclusion.</p> | <p>i) If p then q</p> <p>ii) <u>If q then r</u></p> <p>Form 5 indicates that the conclusion is “if p then r”: If you study, you can buy a car.</p> |

Check Your Progress 1.5

For Questions 7 – 11, consider each pair of statements and find a valid conclusion, if possible.


7.
 - i) You play the piano or guitar.
 - ii) You do not play the piano.

8.
 - i) If you speed, you will get a ticket.
 - ii) If you get a ticket, you lose your license.

9.
 - i) If you water the plant, it will grow.
 - ii) You water the plant.

10.
 - i) You sing or dance.
 - ii) You do not dance.

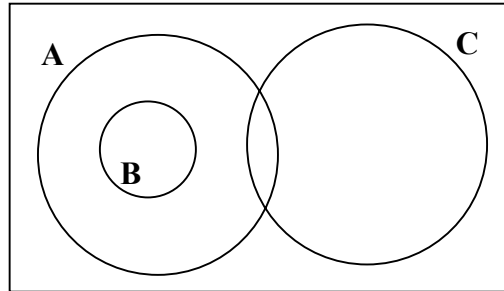
11.
 - i) If you run, then you will win.
 - ii) You do not win.



See If You Remember

SECTIONS 1.1 – 1.4

1. Consider the diagram below, in which no regions are empty.



What is the relationship between sets **B** and **C**?

For Questions 2 and 3, write the rule that directly transforms statement i) into statement ii).

2. i) Not all babies cry.
 ii) Some babies do not cry.
3. i) If today is Tuesday, then I will go to school.
 ii) Today is not Tuesday or I will go to school.

For Questions 4 and 5, negate the statement.

4. If it does not rain, then I will go shopping.
5. Some dancers are in good shape.

Are the following pairs of statements equivalent?

6. i) If the water is warm, Jan will go swimming.
 ii) The water is not warm or Jan will go swimming.
7. i) It is not true that you smoke and drink.
 ii) You do not smoke and you do not drink.
8. i) Not all students are failing the course.
 ii) Some students are not failing the course.