

Name \_\_\_\_\_

## ***Intro to Logic - Study Guide***

1. Why is logic important?
2. What is logic?
3. Three laws of logic
  - a. Law of Identity
  - b. Law of Non-contradiction
  - c. Law of Excluded Middle
4. Part of an argument
  - a. Premises
  - b. Conclusion
5. Two kinds of arguments

a. Deductive

b. Inductive

## 6. Syllogism

a. Example

All crimes are violations of the law.  
Theft is a crime.  
Therefore, theft is a violation of the law.

b. Three kinds of statements used as premises in a syllogism

i. Hypothetical

ii. Disjunctive

iii. Categorical

c. Validity

d. Soundness

## 7. Categorical Statements and Syllogisms

a. Example

All men are mortal.  
Socrates is a man.  
Socrates is mortal.

b. Subject

c. Predicate

d. Copula

e. Quantifier

f. Examples

i. “All flesh is grass...” – **Isaiah 40:6**

ii. No “fornicators, nor idolaters, nor adulterers, ... nor homosexuals,  
... shall inherit the kingdom of God.” – **1 Corinthians 6:9-10**

g. Quality

i. Positive or Negative

ii. Examples

All men are sinners

God is not a man

God is non-man

No circles are squares

h. Quantity

i. Universal or Particular

ii. Examples

All men have sinned

None is righteous, no, not one

Some seed were scattered among the weeds

- i. Four types of propositions
  - i. Type A – Universal Affirmative
    - 1. All S is P
  - ii. Type E – Universal Negative
    - 1. No S is P
  - iii. Type I – Particular affirmative
    - 1. Some S is P
  - iv. Type O – Particular negative
    - 1. Some S is not P
- j. Distribution
  - i. A term is said to be distributed when it refers to all the members of its class
  - ii. Example
    - “[W]hoever believes in Him [will] not perish” – **John 3:16**
  - iii. Type A – Universal affirmative
    - 1. Subject is distributed, predicate is undistributed
  - iv. Type E – Universal negative
    - 1. Subject is distributed, predicate is distributed
  - v. Type I – Particular affirmative
    - 1. Subject is undistributed, predicate is undistributed
  - vi. Type O – Particular negative
    - 1. Subject is undistributed, predicate is distributed

- vii. Big picture
  - 1. Universal subjects and negative predicates are distributed
  - 2. “Unprepared Students Never Pass”

- k. Syllogism form
  - i. Major term

- ii. Minor term

- iii. Middle term

- l. Six rules of the categorical syllogism
  - i. There must only be three terms

- ii. The middle term must be distributed at least once

- iii. Terms distributed in the conclusion must be distributed in the premises

- iv. The conclusion always follows the weaker premise

- v. No conclusion follows from two negative premises

- vi. No negative conclusion follows from two affirmative premises

## 8. Hypothetical Syllogisms

a. If...then statement

b. Antecedent

c. Consequent

d. Modus Ponens (“way of affirming”)

i. Affirming the antecedent

ii. Example 1

If Jesus Christ rose from the dead, then he is God’s Son  
Jesus Christ rose from the dead  
Therefore, he is God’s Son

iii. Example 2

If a contingent being exists, then a necessary being must  
exist as its cause  
A contingent being exists  
Therefore, a necessary being must exist as its cause

iv. Example 3

If there is design in the universe, then there must have been  
a designer  
There is design in the universe  
Therefore, there must have been a designer

e. Modus Tollens (“way of denying”)

i. Denying the consequent

ii. Example 1

If anyone is born of God, then he loves his brothers  
Richard does not love his brothers  
Therefore, Richard is not born of God

iii. Example 2

If God does not exist, then objective moral values do not  
exist  
Objective moral values do exist  
Therefore, God exists

## 9. Disjunctive Syllogisms

a. Either...or statement

b. Make sure all possible alternatives are listed. The surest way is to apply law of Excluded Middle and have the premises contain a pair of contradictions.

c. Example

The fine-tuning of the universe is due to either physical necessity,  
chance, or design

It is not due to physical necessity or chance

Therefore, it is due to design

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## Introduction To Logic Exercises - Part 1

### Exercise 1

*Identify which of the following are arguments and, if they are, which are deductive and which are inductive.*

1. Our university campus study of one hundred students showed a dramatic increase in grades after their becoming Christians; therefore we conclude that conversion to Christianity helps your grade point average.
2. Jesus said, "I am the way, the truth, and the life. No man comes to the Father but through me" (John 14:6).
3. According to the Bible, all sinners need to trust Christ, and you are a sinner. So you need to trust Christ.
4. "There are no miracles, Jesus was not the Son of God, and there is no God."
5. Robert is a Christian and Christians don't use logic, so it's obvious that Robert doesn't know logic.
6. I know Jesus rose from the dead because He appeared to the disciples, the tomb is empty, and even some of his enemies like Paul came to believe in Him.
7. In last night's campus meeting there were thirty-two Catholics, twenty-four nonreligious, and sixteen of various Protestant denominations.
8. The Bible is historically accurate and anything that is historically accurate is trustworthy. So the Bible is trustworthy.
9. Christianity is unique from all the other religions in the world. It is unlike Buddhism, Hinduism, and Islam.
10. I know the Bible is trustworthy because of three things: it never contradicts itself, it doesn't contradict other historical writings, and the manuscript evidence is greater than any other writing of ancient times.

### Exercise 2

*Identify the quantifier (Q), the subject term (S), the copula (C), and the predicate term (P) in the following prepositions. Put brackets around each of the four terms.*

1. All Christians are saved.
2. No Baptists are Presbyterians.
3. Some people who attend church are not true believers.
4. Salvation is a free gift.
5. Bertrand Russell is an atheist.



6. Some atheists are communists.
7. David Hume wrote an argument against believing in miracles.
8. All communists are atheists.
9. Christians who study their Bibles, pray, and obey Christ, will remain in fellowship with God.
10. No nonbelievers will go to heaven.
11. God does not change.
12. I am not an atheist.
13. All people are descendants of Adam.
14. Some descendants of Adam are believers in Christ.
15. Some people are not believers in Christ.

**Exercise 3**

*Identify the following propositions as either universal or particular and as affirmative or negative.*

1. Some people are non-Christians.
2. No atheists are Christians.
3. Some Hindus are not pantheists.
4. Sharon is a member of First Baptist Church.
5. All believers are going to heaven.
6. Logic is not used by everybody.
7. Some angels fell with Satan.
8. God cannot sin.
9. Unhappy people are people who need the Lord.
10. None is righteous.
11. Some Christians are not obedient people.
12. Some Christians are non-obedient people.
13. No man has seen God.
14. All men are not saved.
15. All nonbelievers are non-Christians.
16. Many unsaved people are good neighbors.

**Exercise 4**

*Identify the following as either A, E, I, or O propositions.*

1. No disciples are unkind.
2. Paul was a champion of Christianity.
3. Some church attenders are not paying attention.
4. All Scripture is inspired. (2 Tim. 3:16)
5. Some theologians are wrong.
6. Each and every person needs to trust Christ for his salvation.
7. Nobody seeks God. (Rom. 3:10)
8. God is immutable.
9. They are not among the believers.
10. Those books are in the Bible.
11. Not all preachers are Protestant.

**Exercise 5**

*Determine the type of the following propositions (A, E, I, or O) and the distribution of both the subject and predicate terms.*

1. All enemies of Christ will be defeated.
2. No nonbelievers can understand the things of the Spirit.
3. The Apostle John is the disciple whom Jesus loved.
4. The Bible is the Word of God.
5. Some roads lead to destruction.
6. Some who are standing here will see the kingdom of God.
7. Most atheists are immoral.
8. All unhappy people are not nonbelievers.
9. Judy is not being a good witness for Christ.
10. Some Christians are not nonsmokers.
11. These arguments are ineffective for Christianity.
12. Christ is impeccable.
13. Some who obey Christ are not unfulfilled.
14. No non-Christians will see heaven.
15. Immoral persons can't be trusted.

**Exercise 6**

*For extra credit! ;) Identify the type and distribution of the following propositions.*

1. Nothing ventured, nothing gained.
2. God loves you.
3. Some person is not going to heaven.
4. All atheists are not cruel.
5. Not to trust Christ is to disobey Scripture.
6. All who are not guilty are innocent.
7. Something is better than nothing.
8. None but believers will go to heaven.
9. Everyone except George became a Christian at last night's meeting.
10. Only Jesus can answer the world's problems.

**Exercise 7**

*Identify the major (M), minor (m), and middle (mid) terms and major (M) and minor (m) premises in the following syllogisms.*

1. All agnostics deny any knowledge of God.  
Those who deny any knowledge of God do not make sense.  
Agnostics do not make sense.
2. Some people attend church.  
All Christians attend church.  
Some people are Christians.
3. Everything that has a beginning must have had a cause.  
The universe had a beginning.  
The universe must have had a cause.
4. Some atheists are not moral.  
Renee is an atheist.  
Renee is not moral.
5. No books of the Bible are in error.  
Some books of the Bible are books written by Paul.  
All books written by Paul are not in error.

6. All men are sinners.  
I am a man.  
I am a sinner.
7. All S is M.  
No M is P.  
No S is P.
8. The Bible is the Word of God.  
The Word of God cannot err.  
The Bible cannot err.
9. All who have faith in Jesus are saved.  
Sharon does not have faith in Jesus.  
Sharon is not saved.
10. Those who obey Christ are believers.  
Some Christians do not obey Christ.  
Some Christians are not believers.

### **Exercise 8**

*Using the rules we learned, discover the validity or invalidity of the following syllogisms. Remember: The validity of an argument does not make it true and truthfulness does not make an argument valid. Don't be fooled!*

1. No Christians are unsaved.  
Some people are unsaved.  
Some people are not Christians.
2. Every a is b.  
Every b is c.  
Every c is a.
3. Nothing is better than heaven.  
Life on earth is better than nothing.  
Life on earth is better than heaven.
4. No a is b.  
No b is c.  
No c is a.

5. All men are substances.  
All who are saved are substances.  
All who are saved are men.
6. No P is Q.  
Some S is P.  
Some S is not Q.
7. Some believers are Americans.  
Some church attenders are not Americans.  
Some believers are church attenders.
8. All Bible manuscripts have errors.  
Some errors are certain.  
No manuscripts are certain.
9. All that exists is matter.  
God is not matter.  
God does not exist.
10. A moral absolute is necessary.  
God is necessary.  
God is the moral absolute.
11. Miracles do not exist.  
Miracles prove the existence of God.  
Proof of the existence of God does not exist.
12. Evil is not a substance.  
All substances are created by God.  
Evil is not created by God.
13. Jesus Christ is not a sinner.  
Jesus Christ rose from the dead.  
Jesus Christ is God.
14. No unbelievers are heaven-bound.  
Some who are heaven-bound are not church attenders.  
Some unbelievers are not church attenders.
15. What can be perceived with our senses is true.  
The existence of the soul is not perceived with our senses.  
The existence of the soul is not true.

**Exercise 9**

*Put the following hypothetical arguments into symbolic logic. Determine if they are using modus ponens or modus tollens and if they are either valid or invalid.*

1. If God exists, then man has meaning in life.  
Man has meaning in life.  
God must exist.
2. If Christ did not rise from the dead, then we are lost in our sins. (1 Cor. 15:17)  
It is not the case that Christ did not rise from the dead.  
We are not lost in our sins.
3. If the Bible is the word of God, then it is inerrant.  
The Bible is the word of God.  
It is inerrant.
4. Sally will go to church, if she becomes a Christian.  
Sally went to church.  
She became a Christian.
5. If evolution is true, then the second law of thermodynamics is wrong.  
But the second law of thermodynamics is not wrong.  
Evolution is not true.
6. Christ deceived the apostles concerning His resurrection, if He did not rise in the same physical body He died in.  
Christ cannot deceive the apostles concerning His resurrection.  
Christ rose in the same body He died in.
7. If two propositions contradict, then they both can't be true.  
These two propositions don't contradict.  
They both must be true.
8. If the antecedent is affirmed in a hypothetical syllogism, then it is valid.  
The antecedent is affirmed in this hypothetical syllogism.  
It is valid.
9. There must be a necessary being, if the universe has a cause.  
The universe has a cause.  
There must be a necessary being.

10. If God exists, then miracles are possible.  
 Miracles are possible.  
 God must exist.

### **Exercise 10**

*Put the following disjunctive syllogisms into symbolic logic. Determine if they are either valid or invalid.*

1. Either God exists or He doesn't exist.  
 It is not the case that God doesn't exist.  
 God exists.
2. Either Jesus rose from the dead or He is not God.  
 Jesus rose from the dead.  
 He is God.
3. Either God exists or evil exists.  
 Evil exists.  
 God doesn't exist.
4. Either the law of entropy is not true or the universe had a beginning.  
 The law of entropy is not "not true."  
 The universe has a beginning.
5. Either Christ fulfilled the prophecies concerning the Messiah or the Bible is untrustworthy.  
 Christ fulfilled prophecies concerning the Messiah.  
 The Bible is trustworthy.

Name: \_\_\_\_\_

## Introduction To Logic Exercises - Part 1 (Answer Key)

### Exercise 1

1. *Inductive*
2. *No argument*
3. *Deductive*
4. *No argument*
5. *Deductive*
6. *Inductive*
7. *No argument*
8. *Deductive*
9. *No argument*
10. *Inductive*

### Exercise 2

1. All Christians are saved.  

$$Q \quad S \quad C \quad P$$
2. No Baptists are Presbyterians.  

$$Q \quad S \quad C \quad P$$
3. Some [people who attend church] [are not] [true believers].  

$$Q \quad S \quad C \quad P$$
4. Salvation is [a free gift].  

$$S \quad C \quad P \quad (Q \text{ implied})$$
5. [Bertrand Russell] is an atheist.  

$$S \quad C \quad P \quad (Q \text{ implied})$$
6. Some atheists are communists.  

$$Q \quad S \quad C \quad P$$
7. [David Hume] [wrote an argument against believing in miracles].  

$$S \quad P \quad (Q \text{ \& } C \text{ implied})$$
8. All communists are atheists.  

$$Q \quad S \quad C \quad P$$
9. [Christians who study their Bibles, pray, and obey Christ], [will remain in fellowship with God].  

$$S \quad P \quad (Q \text{ \& } C \text{ implied})$$



10. No nonbelievers [will go to heaven].  
       Q           S                   P           (C implied)
11. God [does not change].  
       S           P           (Q & C implied)
12. I [am not] [an atheist].  
       S   C           P           (Q implied)
13. All people are [descendants of Adam].  
       Q   S   C                   P
14. Some [descendants of Adam] are [believers in Christ].  
       Q                   S           C           P
15. Some people [are not] [believers in Christ].  
       Q   S           C           P

### Exercise 3

1. *Particular Affirmative*
2. *Universal Negative*
3. *Particular Negative*
4. *Universal Affirmative*
5. *Universal Affirmative*
6. *Universal Affirmative*
7. This is the first time we have a proposition that has no copula, so we must supply one. Change the sentence to "Some angels *are being* who fell with Satan." Now it becomes a *Particular Affirmative* proposition.
8. Translate to "God is one who cannot sin." *Universal Affirmative*
9. *Universal Affirmative*
10. Propositions that begin with "None" by itself are treated as if they began with "No one" and are negative. This proposition is *Universal Negative*. However, if a proposition begins with "None but," then it is an exclusive proposition like "Only." See Exercise 6, #8 for handling exclusive propositions.
11. *Particular Negative*
12. *Particular Affirmative*
13. *Universal Negative*
14. This can be either *Universal Negative* or *Particular Negative* depending on how one sees it. Because "All ... are not ..." really means "Not all are ...," or "Some ... are not ...," we will always interpret these as *Particular Negative*. It might help if you rewrite the sentence each time you see it.
15. *Universal Affirmative*

16. *Particular Affirmative*. Terms like *many* and *most* are just greater *somes*.

#### Exercise 4

1. *E*
2. *A*
3. *O*
4. *A*
5. *I*
6. *A*
7. *E*
8. *A*
9. *E*. "They" = "[all] the people in this group to which I refer."
10. *A*. See #9.
11. *O*. See Exercise 3, #14.

#### Exercise 5

1. *A*: *Distributed (D)*, *Undistributed (U)*
2. *E*: *D*, *D*
3. *Simple identity*; *Note the exclusive definite article (the)*.
4. *A*: *D*, *U*
5. *I*: *U*, *U*
6. *I*: *U*, *U*
7. *I*: *U*, *U*; "Most" is not all, but is only some.
8. *O*: *U*, *D*; Remember "All ... are not ..." rule (Exercise 3, #14)
9. *E*: *D*, *D*
10. *O*: *U*, *D*
11. *A*: *D*, *U*
12. *A*: *D*, *U*
13. *O*: *U*, *D*
14. *E*: *D*, *D*
15. Because this is missing the copula, it can be difficult to figure out. It can actually be stated two different ways. The easiest is "Immoral persons *are persons* who can't be trusted." It would then be *A*: *D*, *U*. however you can also say "Immoral persons *are not persons you can trust*" which would be *E*: *D*, *D*. Although either would be acceptable, in general, you should use the one that changes the original the least.

**Exercise 6**

1. A: *D, U*; just insert a copula
2. A: *D, U*
3. E: *D, D*; "Some person" is singular (not "some persons") and for our purposes, singulars are always treated as universals.
4. O: *U, D*
5. A: *D, U*; the 'not' here modifies the subject term, not the copula.
6. A: *D, U*; same as above
7. A: *D, U*; "something" is singular.
8. This is what is called an exclusive sentence. Another way to put it would be "Only believers will go to heaven." Exclusive sentences need to be changed into an A, E, I, or O proposition before we can work with them. This is a two-step process: 1) change "only" or "non but" to "all" and 2) switch the subject and the predicate terms. So our original sentence becomes "All who go to heaven are believers," which is A: *D, U*.
9. This is what is called an exceptive sentence. It also needs to be changed into an A, E, I, or O proposition. However, we have a couple of different options to choose from. This example could be translated, "All who are not George became Christians at last night's meeting," which would be A: *D, U* (the "are not" here is modifying the subject term, not the copula). It could be translated, "George is not someone who became a Christian at last night's meeting," which is E: *D, D*. There is no preference for which you use, either will work.
10. Same as #8; "All the answers to the world's problems are answers found in Jesus"; A: *D, U*

**Exercise 7**

1.
 

<i>m</i>	<i>mid</i>
All agnostics deny any knowledge of God. ( <i>m</i> )	
<i>m</i>	<i>M</i>
Those who deny any knowledge of God do not make sense. ( <i>M</i> )	
<i>m</i>	<i>M</i>
Agnostics do not make sense.	
2.
 

<i>m</i>	<i>mid</i>
Some people attend church. ( <i>m</i> )	
<i>M</i>	<i>mid</i>
All Christians attend church. ( <i>M</i> )	
<i>m</i>	<i>M</i>
Some people are Christians.	
3.
 

<i>mid</i>	<i>M</i>
Everything that has a beginning must have had a cause. ( <i>M</i> )	
<i>m</i>	<i>mid</i>

The universe had a beginning. (*m*)

*m* *M*

The universe must have had a cause.

4. *mid* *M*

Some atheists are not moral. (*M*)

*m* *mid*

Renee is an atheist. (*m*)

*m* *M*

Renee is not moral.

5. *mid* *M*

No books of the Bible are in error. (*M*)

*mid* *m*

Some books of the Bible are books written by Paul. (*m*)

*m* *M*

All books written by Paul are not in error.

6. *mid* *M*

All men are sinners. (*M*)

*m* *mid*

I am a man. (*m*)

*m* *M*

I am a sinner.

7. *m* *mid*

All S is M. (*m*)

*mid* *M*

No M is P. (*M*)

*m* *M*

No S is P.

8. *m* *mid*

The Bible is the Word of God. (*m*)

*mid* *M*

The Word of God cannot err. (*M*)

*m* *M*

The Bible cannot err.

9. *mid* *M*

All who have faith in Jesus are saved. (*M*)

*m* *mid*

Sharon does not have faith in Jesus. (*m*)

*m* *M*

Sharon is not saved.

10.  $\begin{array}{ccc} mid & & M \\ \text{Those who obey Christ are believers. } (M) \\ m & & mid \\ \text{Some Christians do not obey Christ. } (m) \\ m & & M \\ \text{Some Christians are not believers.} \end{array}$

### Exercise 8

1. *Valid*
2. *Invalid*
3. *Invalid*
4. *Invalid*
5. *Invalid*
6. *Valid*
7. *Invalid*
8. *Invalid*
9. *Valid*
10. *Invalid*
11. *Invalid*
12. *Invalid*
13. *Invalid*
14. *Invalid*
15. *Invalid*

### Exercise 9

1. *Invalid, Affirming the Consequent*
2. *Invalid, Denying the Antecedent   Valid, Modus Ponens*
3. *Invalid, Affirming the Consequent*
4. *Valid, Modus Tollens*
5. *Valid, Modus Tollens*
6. *Invalid, Denying the Antecedent*
7. *Valid, Modus Ponens*
8. *Valid, Modus Ponens*

9. *Invalid, Affirming the Consequent*

**Exercise 10**

1. *Valid*
2. *Invalid, Affirmed the Alternant*
3. *Invalid, Affirmed the Alternant*
4. *Valid*
5. *Invalid, Affirmed the Alternant*