Introduction to Logic
Exercises: Square of Opposition Answers

1 Contrary

Directions: State the **contrary** of each of the following statements. *First*, state the resultant truth value if the given statement is assumed true; *second*, state the resultant truth value if the given statement is assumed false.

1. **All voters are citizens**.
   Answer:
   All voters are citizens. $true \stackrel{contrary}{\Longrightarrow}$ No voters are citizens. $false$
   All voters are citizens. $false \stackrel{contrary}{\Longrightarrow}$ No voters are citizens. $undetermined$

2. **No kinetic arts are mass cults**.
   Answer:
   No kinetic arts are mass cults. $true \stackrel{contrary}{\Longrightarrow}$ All kinetic arts are mass cults. $false$
   No kinetic arts are mass cults. $false \stackrel{contrary}{\Longrightarrow}$ All kinetic arts are mass cults. $undetermined$

2 Subcontrary

Directions: State the **subcontrary** of the following statements. *First*, state the resultant truth value if the given statement is assumed true; *second*, state the resultant truth value if the given statement is assumed false.

1. **Some microbes are marine organisms**.
   Answer:
   Some microbes are marine organisms. $true \stackrel{subcontrary}{\Longrightarrow}$ Some microbes are not marine organisms. $undetermined$
   Some microbes are marine organisms. $false \stackrel{subcontrary}{\Longrightarrow}$ Some microbes are

not marine organisms. *true*

2. **Some shales are not compressed sandstone**.
   Answer:
   Some shales are not compressed sandstone. *true* $\stackrel{subcontrary}{\Longrightarrow}$ Some shales are compressed sandstone. *undetermined*
   Some shales are not compressed sandstone. *false* $\stackrel{subcontrary}{\Longrightarrow}$ Some shales are compressed sandstone. *true*

3   Subalternation

Directions: Use **subalternation** for the following statements. *First*, state the resultant truth value if the given statement is assumed true; *second*, state the resultant truth value if the given statement is assumed false.

1. **All Zurich gnomes are bankers**.
   Answer:
   All Zurich gnomes are bankers. *true* $\stackrel{subalternation}{\Longrightarrow}$ Some Zurich gnomes are bankers. *true*
   All Zurich gnomes are bankers. *false* $\stackrel{subalternation}{\Longrightarrow}$ Some Zurich gnomes are bankers. *undetermined*

2. **No ribosomes are genes**.
   Answer:
   No ribosomes are genes. *true* $\stackrel{subalternation}{\Longrightarrow}$ Some ribosomes are not genes. *true*
   No ribosomes are genes. *false* $\stackrel{subalternation}{\Longrightarrow}$ Some ribosomes are not genes. *undetermined*

3. **Some foreign pipelines are safe investments**.
   Answer:
   Some foreign pipelines are safe investments. *true* $\stackrel{subalternation}{\Longrightarrow}$ All foreign pipelines are safe investments. *undetermined*
   Some foreign pipelines are safe investments. *false* $\stackrel{subalternation}{\Longrightarrow}$ All foreign pipelines are safe investments *false*

4. **Some Presidents are not smilers**.
   Answer:
   Some Presidents are not smilers. *true* $\stackrel{subalternation}{\Longrightarrow}$ No Presidents are smilers. *undetermined*
   Some Presidents are not smilers. *false* $\stackrel{subalternation}{\Longrightarrow}$ No Presidents are smilers. *false*

4   Contradiction

Directions: Use **contradiction** for the following statements. *First*, state the resultant truth value if the given statement is assumed true; *second*, state the resultant truth value if the given statement is assumed false.

1. **All scientists are curious persons**.
   Answer:
   All scientists are curious persons. *true* $\overset{contradiction}{\Longrightarrow}$ Some scientists are not curious persons. *false*
   All scientists are curious persons. *false* $\overset{contradiction}{\Longrightarrow}$ Some scientists are not curious persons. *true*

2. **No artists are analysts**.
   Answer:
   No artists are analysts. *true* $\overset{contradiction}{\Longrightarrow}$ Some artists are analysts. *false*
   No artists are analysts. *false* $\overset{contradiction}{\Longrightarrow}$ Some artists are analysts. *true*

3. **Some historians are narrators**.
   Answer:
   Some historians are narrators. *true* $\overset{contradiction}{\Longrightarrow}$ No historians are narrators. *false*
   Some historians are narrators. *false* $\overset{contradiction}{\Longrightarrow}$ No historians are narrators. *true*

4. **Some citizens are not state employees**.
   Answer:
   Some citizens are not state employees. *true* $\overset{contradiction}{\Longrightarrow}$ All citizens are state employees. *false*
   Some citizens are not state employees. *false* $\overset{contradiction}{\Longrightarrow}$ All citizens are state employees. *true*

Be sure you have given the resultant truth values.   Name _____