

# CIS 301: Logical Foundations of Programming

## Module: Natural Deduction Exercise: English Language to Propositional Logic

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CIS 301 --- NatDed -- English Language  
to Propositional Logic

# Exercise

Convert each statement below into symbolic form/propositional logic.

- a. The sun is hot but it is not humid.
- b. If John doesn't pass then he will lose his scholarship and drop out of school.
- c. If it rains and you don't open your umbrella then you will get wet.
- d. If your car doesn't start or you don't wake up on time then you will miss your interview and you will not get the new job.
- e. If you elect Mary then Mary will make sure that the federal budget will be balanced, partisan wrangling in Washington will cease, and there will be no cuts in social security benefits.
- f. If the cake gets hot then icing melts and if the icing melts then cake cannot be used at the wedding reception.
- g. If the New York Yankees win the world series and the New York Jets win the super bowl then New York fans will be overjoyed and dance in the streets.

# Exercise

a. The sun is hot but it is not humid.

**p** – Sun is hot

**q** – It is humid

**Answer :  $p \wedge \neg q$**

# Exercise

- b. If John doesn't pass then he will lose his scholarship and drop out of school.

**p** – John passes

**q** – John will lose his scholarship

**r** – John will drop out of school

**Answer :**  $\neg p \rightarrow (q \wedge r)$

# Exercise

- c. If it rains and you don't open your umbrella then you will get wet.

**p** – It rains

**q** – You open your umbrella

**r** – You will get wet

**Answer :**  $p \wedge \neg q \rightarrow r$

# Exercise

- d. If your car doesn't start or you don't wake up on time then you will miss your interview and you will not get the new job.

**p** – Car starts

**q** – You wake up on time

**r** – You will miss your interview

**s** – You will get the new job

**Answer :**  $\neg p \vee \neg q \rightarrow r \wedge \neg s$

# Exercise

- e. If you elect Mary then Mary will make sure that the federal budget will be balanced, partisan wrangling in Washington will cease, and there will be no cuts in social security benefits.

**p** – You elect Mary

**q** – Mary will make sure that the federal budget will be balanced

**r** – Partisan wrangling in Washington will cease

**s** – There will be cuts in social security benefits

**Answer :**  $p \rightarrow q \wedge r \wedge \neg s$

# Exercise

- f. If the cake gets hot then icing melts and if the icing melts then cake cannot be used at the wedding reception.

**p** – Cake gets hot

**q** – Icing melts

**r** – Cake can be used at the wedding reception

**Answer :**  $(p \rightarrow q) \wedge (q \rightarrow \neg r)$



# Exercise

- g. If the New York Yankees win the world series and the New York Jets win the super bowl then New York fans will be overjoyed and dance in the streets.

**p** – New York Yankees win the world series

**q** – New York Jets win the super bowl

**r** – New York fans will be overjoyed

**s** – New York fans will dance in the streets

**Answer :  $p \wedge q \rightarrow r \wedge s$**