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Activity #1

ILO: Formulate and construct logical proofs and statements to solve mathematical problems.

Part I – Symbolic Representation (*10 points*)

Express each of the following in symbolic form using appropriate logical connectives. (***2 points each***)

1. If it rains, then the ground is wet.

   Answer: _____

2. Either Maria studies or she fails the exam.

   Answer: _____

3. If the computer is not working, then the project will be delayed.

   Answer: _____

4. The number 7 is prime and odd.

   Answer: _____

5. Either the moon is made of cheese or 2 is an even prime.

   Answer: _____

Part II – Truth Tables (*15 points*)

Construct a truth table for each compound proposition. Determine whether it is a tautology, contradiction, or contingency. (5 points each)

1. $(p \vee q) \rightarrow (q \vee p)$

p	q	$p \vee q$	$q \vee p$	$(p \vee q) \rightarrow (q \vee p)$
T	T			
T	F			
F	T			
F	F			

2. $(p \rightarrow q) \land (q \rightarrow r) \rightarrow (p \rightarrow r)$

p	**q**	**r**	$(p \rightarrow q)$	$(q \rightarrow r)$	$(p \rightarrow r)$	$(p \rightarrow q) \land (q \rightarrow r) \rightarrow (p \rightarrow r)$
T	T	T				
T	T	F				
T	F	T				
T	F	F				
F	T	T				
F	T	F				
F	F	T				
F	F	F				

3. $(p \land \neg p) \lor q$

p	**q**	$(p \land \neg p)$	$(p \land \neg p) \lor q$
T	T		
T	F		
F	T		
F	F		

Part III – Logical Equivalences (*15 points*)

Use logical identities (laws of propositional logic) to simplify the following. Show every step. (5 points each)

1. $(p \lor (q \land p)) \land (\neg p \lor r)$

Solution/Steps:

2. $\neg(p \lor q) \lor (p \land q)$

Solution/Steps:

3. $(p \rightarrow q) \wedge (p \rightarrow \neg q)$

Solution/Steps:

Scoring Rubric

Part	Criteria	Points
Part I – Symbolic Representation	Each item = **2 pts** - Correct symbolic translation (2) - Minor error (1) - Incorrect (0)	10
Part II – Truth Tables	Each item = **5 pts** - Correct truth table (3) - Correct identification (1) - Presentation neatness/logic (1)	15
Part III – Logical Equivalences	Each item = **5 pts** - Application of equivalence laws (2) - Complete simplification (2) - Steps shown (1)	15
TOTAL		**40**

Prepared by:

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