Faculty of Computing & Information Technology
Computer Science Department

Assignment #1 - CPCS 222 (Winter 2022-23)
(Boy's campus)

Due: Sunday (08/01/2023)
Student Name : _____ Student ID: _____
Section : _____

1. Construct a truth table for $(a \rightarrow \neg b) \wedge (\boldsymbol{b} \oplus \neg c)$

a	**b**	**c**	$\neg \boldsymbol{b}$	$a \rightarrow \neg b$	$\neg \boldsymbol{c}$	$\boldsymbol{b} \oplus \neg \boldsymbol{c}$	**Result**
T	T	T					
T	T	F					
T	F	T					
T	F	F					
F	T	T					
F	T	F					
F	F	T					
F	F	F					

2. Translate the English statement into propositional logic - *"If I get paid today, I will not go to Spain and London."*

3. Negate the English statement given in question 2

4. Write the converse, inverse and contrapositive of the propositional logic obtained from question 2.

Contrapositive (English and logic)	
Inverse (English and logic)	
Converse (English and logic)	

5. Show that $\neg(p \vee (\neg p \wedge q)) \equiv (\neg p \wedge \neg q)$ using truth tables

p	**q**	**¬p**	**¬q**	$\neg(\boldsymbol{p} \vee (\neg \boldsymbol{p} \wedge \boldsymbol{q}))$	$(\neg \boldsymbol{p} \wedge \neg \boldsymbol{q})$
T	T				
T	F				
F	T				
F	F				

6. For Questions 6a and 6b, translate the English statements into predicate logic where the domain of students is all students in FCIT
   Hint: Use S(x) – x is a student in FCIT and J(x) – x lives in Jeddah

6a: "Some students *in FCIT lives in Jeddah"*

6b: "All students in FCIT lives in Jeddah"

7. Show that $[\neg q \wedge (p \rightarrow q)] \rightarrow \neg p$ is a tautology

Expression	**Rule**
$[\neg q \wedge (p \rightarrow q)] \rightarrow \neg p$	

8. Given below are arguments and a rule of inference. Write the correct rule in each case.

"If I go swimming, then I will stay in the sun too long. If I stay in the sun too long, then I will sunburn. Therefore, if I go swimming, then I will sunburn."

9. Each row in the following table contains independent premises. Show what can be concluded, if it is possible, and give the name of the rule in each.

1.	$\forall x\big(P(x) \rightarrow Q(x)\big)$ _____ $\therefore$	
2.	$P(a) \wedge \neg R(a)$ _____ $\therefore$	
3.	$p \rightarrow s$ s _____ $\therefore$	
4.	$p \rightarrow s$ $\neg p$ _____ $\therefore$	
5.	$\neg p \rightarrow s$ $\neg p$ _____ $\therefore$	

10. If m is an odd number and n is an even number, prove that the expression $m^2 + mn - 1$ is even.