University of Bahrain Department of Mathematics MATHS253: Set Theory Fall 2018 Dr. Abdulla Eid



Homework 1: Propositions due October 4, 2018

Name: _

- 1. Determine whether each of the following is a proposition or not. If so, write the truth value of it.
 - 1. "Montevideo is the capital of Uruguay".
 - 2. "Don't feed the aminal".
 - 3. "2+2=5 and 7+1=8".
 - 4. "It that all?"
 - 5. "He enjoyed the comedy show".
 - 6. "If I get an A, then I will celebrate".
 - 7. "Bahrain is an island".
 - 8. "This course is cool".
- 2. Write the negation of the following propositions:
 - 1. "My favorite flavor is chocolate".

- 2. "This is not the time to complain".
- 3. "The exact number of words in this sentence is ten". Read the statement and your answer once again and discuss whether they are true or false. Explain the problem that arises.

3. (points) Let p, q and r be the propositions:

p: "You have the flu"q: "You miss the final exam"r: "You pass the course"

Express each of the following propositions as an English statements.

1. $p \rightarrow q$. 2. $\neg q \rightarrow r$. 3. $q \rightarrow \neg r$. 4. $p \lor q \lor r$. 5. $(p \rightarrow \neg r) \lor (q \rightarrow \neg r)$. 6. $(p \land q) \lor (\neg q \land r)$. 4. (points) Let p, q and r be the propositions:

p: "You get full mark in the final exam"q: "You do every exercise in the book"r: "You get an A in this class"

Write the following propositions using p, q and r and logical connectives:

- 1. "It is not the case that you get an A in this class".
- 2. "You get an A in this class, but you do not do every exercise in the book".
- 3. "You get an A in this class or you get full mark in the final, but not both".
- 4. "You get full mark in the final, you do every exercise in the book and you get an A in this class".
- 5. "You get an A in this class whenever you do every exercise in the class"
- 6. "You get an A in this class only if you do every exercise in the book."
- 7. "To get an A in this class, it is necessary for you to get full mark in the final."
- 8. "You get full mark in the final exam if you get an A in this class".
- 9. "You get a full mark in the final, but you don't do every exercise in the book; nevertheless you get an A in this class"

- 10. "Getting a full mark in the final exam and doing every exercise in the book is a sufficient condition for getting an A in this class."
- 11. "You will get an A in this class if and only if you do every exercise in the book or you get full mark in the final."
- 12. "If you do every exercise in the book is sufficient and necessary condition to get full mark in the final"
- 5. Let p, q be the propositions:

p: "You eat candy"
q: "You gain weight"

- 1. Write the statement $p \to q$.
- 2. Suppose you didn't eat any candy, nevertheless you gained some weight. is this a violation to the fact $p \rightarrow q$?
- 3. What is the converse of $p \to q$.
- 4. What is the contrapositive of $p \to q$.
- 5. What is the negation of $p \to q$.
- 6. Let p, q be two propositions. The **exclusive or** of p and q, denoted by $p \oplus q$, is the proposition "p or q, but not both". Write $p \oplus q$ using the basic propositional operators \land, \lor, \neg and construct the truth table of $p \oplus q$.