1) Use Truth Tables to verify the following. Be very complete in truth table set up. Justify the truth value of each individual part of the identities below.

   a) \[(p \lor q) \land p \equiv p\]
   b) \[p \lor \sim (q \land p) \equiv p \lor \sim q\]

2) Given the following statements:

   P: Martin is a freshman in the Corps of Cadets.
   Q: Jane is a junior math major.
   R: Ryan is a sophomore CS major only.

   A) The statement P is true and the statement Q is false and R is true. Express each of the following compound sentences in symbolic logic and determine the truth value of the sentence.
      1) Martin is in the corps or Ryan and Jane are both freshman.
      2) Either Ryan is a math major or a CS major.
      3) Martin is not in the Corps and he is a senior math major.

   B) The statement P is true and the statement Q is false and R is true. Determine the truth value of each of the following compound statements and then convert to English sentences.
      1) \(\sim (\sim P \lor R) \land Q\)
      2) \(\sim (P \oplus Q) \lor \sim R\)

3) The nand operator denoted by “\(\lnot\)” is defined by \(PIQ \iff \sim (P \land Q)\)
   1) Give the truth table for \(PIQ\)
   2) If you are given that \(\sim p \Leftrightarrow p\) then express \(p \lor q\) in terms of the nand operator only.

4) Which of the following statements is the Exclusive Or and which is the Inclusive Or?
   1) You may major in Mathematics or you may major in Computer Science.
   2) You can spend this semester break in Florida or you can work with Habitat for Humanity in North Carolina.
   3) In order to get this job you must have four years of experience or a master’s degree.
   4) Either Jane is coming or there is a lot of snow.

   Continued:
Problem 5:
Put this problem on a separate sheet of paper with your name:
NAME:____________________________________________

Logic Puzzle:
Solve the following puzzle and then write up a paragraph explaining your reasoning. Use your own judgment on how to write this up. It needs to be clear to anyone who tries to follow your reasoning. Do not include tables or charts in your write up and justify each of your conclusions. Give a summary of your results at the end of your write up.

A Fishing Vacation:
Carl and his three friends who are avid fishermen decided to visit four of the world’s finest fishing locations over a period of four years. Each friend had a different favorite location, so they chose the order in which they would take the trips by drawing the place names from a hat. Based on the statements below, what is the first name (Andy, Bill, Carl, or Dennis) and surname (one is Cole) of each friend, what was the favorite fishing location of each, and what was the order in which the trips were to be taken?
One of the following statements below is false.

1) Andy and Barrott work for the same company and Bill is self-employed.
2) The Iceland trip was planned for the year before the Alaska trip.
3) The Alaska trip was not Andy’s favorite destination.
4) Carl and Barrott and their wives frequently play bridge together.
5) Whelan’s favorite fishing location was the third trip, which was neither Patagonia nor New Zealand.
6) Whelan and Cole are married; the other two are not.
7) Dennis was disappointed that his favorite destination, New Zealand, was not to be the first trip, Crowley’s favorite destination was planned for the last trip, so he was unsympathetic.
8) Barrott’s favorite destination was the first.

Grader: Assign a grade as follows:
Part 1: Read the student’s write up carefully and assign the “write up” points from 1 to 5 according to your subjective assessment of its clarity. (Points:_______)
Part 2: The summary is worth 5 points if correct and 3 points if incorrect and 0 points if no summary is given. (Points :_______)
Name of Grader:________________________________________________________