MIDTERM EXAM
DISCREET STRUCTURES

1. Consider the statement about a party, “If it's your birthday or there will be cake, then there will be cake.”
a. Translate the above statement into symbols. Clearly state which statement is PP and which is Q.Q.
b. Make a truth table for the statement.
c. Assuming the statement is true, what (if anything) can you conclude if there will be cake?
d. Assuming the statement is true, what (if anything) can you conclude if there will no cake?
e. Suppose you found out that the statement was a lie. What can you conclude?

2. Which of the following logical expression is the translation of the English sentence?
"It is a nice day; and if it is cloudy then it will rain."

p = It is a nice day

q = It is cloudy

r = It will rain

3. There are 5 people in a room, and everyone shakes hand with everyone else exactly once. How many handshakes occur?

4. To how many different ways can we arrange 5 books on a shelf?

ANSWERS ARE ON THE SECOND PAGE OF THE FILE

Answers:

1. Consider the statement about a party, “If it's your birthday or there will be cake, then there will be cake.”
    a. P = “If it’s your birthday”
    Q = “There will be a cake”
    $(P \vee Q) \rightarrow Q$
    b.

B	C	B∨C	(B∨C)→C
T	T	T	T
T	F	T	F
F	T	T	T
F	F	F	T

    c. If the statement is true, I cannot conclude wether it’s my birthday or not because it can be either true or false.
    d. We can conclude that it is not my birthday
    e. We can conclude that it is my birthday AND there will be no cake,
2. Which of the following logical expression is the translation of the English sentence? "It is a nice day; and if it is cloudy then it will rain."
    a. The sentence has two main parts joined by the word “and” therefore we will use the logical expression AND(∧)
    (p∧(q→r)
3. C = n!/(n-r)!r!
    n = 5
    r = 2
    = 5! / (5-2)!2!
    = 10
4. Permutation = n!
    n = 5
    5! = 5x4x3x2x1
    = 120