DISCRETE MATHEMATICS - 411 ASSIGNMENT NO.2

EXERCISE 1.1

27. State the converse, contrapositive, and inverse of each of these conditional statements.
a) If it snows today, I will ski tomorrow.
b) I come to class whenever there is going to be a quiz.
c) A positive integer is a prime only if it has no divisors other than 1 and itself.

39. Construct a truth table for $(p \leftrightarrow q) \leftrightarrow ($ $\leftrightarrow s)$.

43. Find the bitwise *OR*, bitwise *AND*, and bitwise *XOR* of each of these pairs of bit strings.
c) 00 0111 0001, 10 0100 1000
d) 11 1111 1111, 00 0000 0000

44. Evaluate each of these expressions.

c) $(0\ 1010 \oplus 1\ 1011) \oplus 0\ 1000$

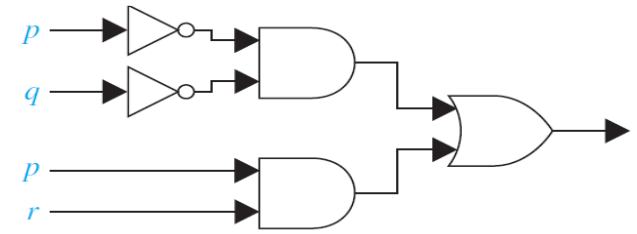
d) $(1\ 1011 \vee 0\ 1010) \wedge (1\ 0001 \vee 1\ 1011)$

EXERCISE 1.2

7. Express these system specifications using the propositions
p "The message is scanned for viruses" and q "The message was sent from an unknown system" together with logical connectives (including negations).
a) "The message is scanned for viruses whenever the message was sent from an unknown system."
b) "The message was sent from an unknown system but it was not scanned for viruses."
c) "It is necessary to scan the message for viruses whenever it was sent from an unknown system."
d) "When a message is not sent from an unknown system it is not scanned for viruses."

41. Find the output of each of these combinatorial circuits.

b)



EXERCISE 1.3

21. Show that $\neg (p \leftrightarrow q)$ and $\neg p \leftrightarrow q$ are logically equivalent.

29. Show that $(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r)$ is a tautology.

33. Show that $(p \rightarrow q) \rightarrow (r \rightarrow s)$ and $(p \rightarrow r) \rightarrow (q \rightarrow s)$ are not logically equivalent.

EXERCISE 1.6

1. Find the argument form for the following argument and determine whether it is valid. Can we conclude that the conclusion is true if the premises are true?

If Socrates is human, then Socrates is mortal.
Socrates is human.
$\therefore$ Socrates is mortal.