ECS 20 Discrete Math: Discussion 2 Mock Quiz Answers

1. State the order of precedence for the logical operators ∧, ∨, ¬, and →.

$$\neg > \wedge > \vee > \rightarrow$$

2. Write down a truth table for the formula $\theta = \neg P \wedge (\neg P \rightarrow Q)$

P	Q	$\neg P$	$\neg P \rightarrow Q$	θ
0	0	1	0	0
0	1	1	1	1
1	0	0	1	0
1	1	0	1	0

Is $\neg P \wedge (\neg P \rightarrow Q)$ logically equivalent to $\neg P \rightarrow Q$? No.

Re-write $\neg P \wedge (\neg P \rightarrow Q)$ using the least number of logical operators. $\neg P \wedge Q$

3. State DeMorgan's Law. $\neg(P \wedge Q) = \neg P \vee \neg Q$

4. Translate the following sentences into a formula of sentential logic: "A country must shut down the government if it has a political deadlock and its head of state does not negotiate. An exception is made for European and Communist countries."

Use HasPoliticalDeadlock, HeadOfStateNegotiates, European, Communist, ShutDownGovt in your answer.

HasPoliticalDeadlock ∧ ¬HeadOfStateNegotiates ∧ ¬European ∧ ¬Communist → ShutDownGovt

ECS 20 Discrete Math: Discussion 2 Problem Set 2 notes

1. Cut and shuffle π_0 in your proposed number of moves to see if you can indeed reach π.

2. Treat `if s then p else q` like code. It is the same as `if s ? p : q` or

   ```
   if (s) {
     output = p;
   } else {
     output = q;
   }
   ```

3. A mux (multiplexor) is a common device in circuit design that selects one signal to output from multiple inputs.

4. You need not define variables for the various conditions. Use words or phrases like in #4 of the mock quiz for the various conditions to formulate the answer.

5. You may define variables, for example G_A, to mean that A is guilty (copied). A student cannot be both guilty and innocent, though there may not be enough information to show either way. A student can only be completely truthful or completely lying.

6. Recall that $\{\wedge, \vee, \neg\}$ is logically complete.

7. A party function returns 1 when the input contains an odd number of ones. Note: an earlier version of this assignment contained a non-essential typo for the parity function formula.