EECS 1090 – Possible Test Format Instructor: Jeff Edmonds

- Fill out the bubble sheets at the end of the exam. Even if you have to guess, answer EVERY question. 50% here will likely not be a passing grade.
- 2. Fill out the table with all of the rules.

	Proof Techniques/Lemmas			
	Using		Proving	
	From:	Conclude	From:	Conclude
And \land :	Separating And		$\operatorname{Eval/Build/Simplify} \land$	
Or V:	Selecting Or		Eval/Build	/Simplify∨
				/
	Cases		Excluded Middle	
Implies \rightarrow :	Modus Ponens		Deduction	
	Cases		${\rm Eval/Build/Simplify} \rightarrow$	
	Equivalence Transitivity		Contrapositive	
			De Morgan's Law	
			-	

- 3. Use the purple table to prove the following statement: ??? SOME STATEMENT ???
 - Ent. This man had had bet and in
 - Hint: This may look hard but you can just bang it out.

Start by putting at the bottom of your page the line

100) ??? SOME STATEMENT ??? ??.

To prove \rightarrow , use Deduction.

If you have a \rightarrow , try to use Modus Ponens.

If you don't quite have what you want, build it up with either the Build And or the Build OR rule. If you have an $C \vee D$ that you don't know what to do with, start a Proof By Cases of what you want from these cases.

Number your lines so that you can refer to them when you use some rule.

Do NOT convert the \rightarrow into and or or or use the distributive rule.

4. Find all possible assignments of the variables that makes the following expression true/satisfied. Explain all of the steps in your search for the assignment and in proving that this assignment works. Use Purple table reasoning, not a table.

Hint: Start with proof/search by cases with the $p \lor q$, then see how you can force the values of other variables.

??? SOME STATEMENT ???

Follow this logic left to right.

In the end, conclude by stating how many different satisfying assignments are there?

- 5. Consider the expression ??? SOME STATEMENT ???
 - (a) Take the negation of this and work the negation all the way in.
 - (b) Play the Jeff's prover/adversary game in order to prove this that this negated statement is true over the reals.

Likely we will not get to using the Oracle in a proof before first test. Hence, a question like this will likely be saved until the second test.

6. For each of the following statements ϕ . State whether or not it is valid/tautology and do ONE of the following:

Valid:

Informal Proof: Give a prover/adversary/oracle proof of it as done in class. Be sure who is providing which objects, eg x_{\forall} or x_{\exists} . Be sure in each line to state how you know you can add this next line. Being "informal", I happened to say "By Modus Ponens with (2) and (3), ...", but you can just as well do the line like done with formal proofs, where the rule "Modus Ponens (2&3)" is stated tabbed to the right. Either way, number your lines so that you can refer to them when you use some rule. Have a line "Goal: Prove ..." often to remind everyone where you are going.

Not Valid:

- **Counter Example:** Prove it is not valid by constructing a universe in which the statement is false. For example, you might say that $\alpha(0)$ is true, $\alpha(1)$ is false, Then proceed to show how the statement is false in this universe. Do this by building up ϕ piece by piece. For example: $\alpha(1)$ is false. Hence, $\forall x \ \alpha(x)$ is false. Hence, $[\forall x \ \alpha(x)] \rightarrow$ "no racism" is true.
- **Informal Proof:** Try to give a prover/adversary/oracle proof of it as done above and when stuck, stop and indicate what goes wrong.

Here are the $\phi.$

- (a) ??? SOME STATEMENT ???
- (b) ??? SOME STATEMENT ???