EE 2720, [redacted] F05

Test 2 Review

EE 2720

- Test 2

[redacted]

Closed books.
Closed notes.
No calculators.

- Materials: Handouts # 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16
- Study homeworks # 3, 4, 5, 6. I will probably ask problems similar to those in the homeworks.

Test 2 review

- Handout #5: This handout mainly talks about switching-algebra theorems. You should remember all of them except:
- The consensus theorem (T11) which states $X \cdot Y + X' \cdot Z + Y \cdot Z = X \cdot Y + X' \cdot Z$; (if you need this, I will give it to you).
- The theorem that states $X \cdot Y' + Y = X + Y$; (if you need this, I will give it to you).

ine Shannon's expansion theorems (T15 and CT15'); (you will not need them; we never used them).

•All you need to remember is half the theorems. You can very easily get the other half by applying the principle of duality. So, remember the principle of duality.

• You should know how to prove the switching-algebra theorems. I provided many proofs in handout #5 and asked many more in the homeworks. I will probably ask in test 2 proving some -heorem(s). At least one.

andout #6: This handout mainly talks about -ultiplying out and factoring. The main the- -ems used for multiplying out and factoring -e the following:

$$X \cdot (Y+Z) = X \cdot Y + X \cdot Z \quad CT8)$$

$$(X+Y) \cdot (X+Z) = X + Y \cdot Z \quad CT8')$$

$$(X+Y) \cdot (X'+Z) = X \cdot Z + X' \cdot Y \quad C1)$$

will give you at least one problem in .1- iplying out or factoring or both. In

case, I will give you the above mentioned theorems (T8), (T8') and theorem of eq.(1) and tell you in which order to apply them (like I did in homework #4).

• Handout #7: This handout mainly talks about applications of multiplying out and factoring, so there is not too much to remember here. The handout also talks about proving the validity of an equation. For this subject you mainly need to apply the theorems of switching algebra. Another way is to provide the canonical sums or canonical products of both left and right side of the equation you try to prove, and show that they are equal.

• Handout #8: At first this handout presents the principle of duality. You must remember it because it halves the amount that you have to learn. The handout then talks about minterms, maxterms, canonical sums and canonical products. I will definitely ask you to provide the canonical sum of a logic function and the canonical product of a logic function.

• Handout #9: At first this handout presents the n-input AND gate, the n-input OR gate, the n-input NAND gate and the n-input NOR gate. These are very easy materials and I am sure you remember them. At the end, the handout talks about the facts that any logic function can be realized using only NAND gates or only NOR gates. I am sure you remember this since we have seen that a million times!!

• Handout #10: This handout mainly talks about alternative realizations of a logic function like AND-OR realization, realization using only NAND gates, realization using only OR and NAND gates, realization using only NOR and OR gates, OR-AND realization, realization using only NOR gates, realization using only AND and NOR gates and realization using only NAND and AND gates
The most important thing to know here is how to realize a logic function using only NAND gates or only NOR gates. You should know how to do this by using the graphical approach (bubbles etc) as well as the algebraic approach which is based on DeMorgan's theorem. So by all means you should remem-

ber DeMorgan's theorem. And remember that NAND and NOR gates are faster and cheaper and therefore preferred.

• Handout #11: This handout mainly talks about the XOR and XNOR gates. What you should remember here is:

$$X \oplus Y = X' \cdot Y + X \cdot Y' = (X+Y) \cdot (X'+Y')$$

$$(X \oplus Y)' = X' \cdot Y' + X \cdot Y = (X+Y') \cdot (X'+Y).$$

• Handout #12: This handout talks about combinational-circuit analysis. There is nothing to remember here. You know everything very well. Nothing new.

• Handout #13: This handout talks about combinational-circuit synthesis (design). The type of problem I might ask on the test is the following: Given a problem described by words, design the corresponding circuit. To become more specific, given a problem described by words, provide a truth table, Karnaugh maps, simplified logic equations and logic diagrams. I provided three problems like this in handout #13 and assigned another four in homework #6. So study all of them.

- Handouts # 14, 15, 16: These three handouts are the last ones and they all talk about the most important subject in the course, which is the subject on karnaugh maps. Here, you must know how to provide simplified sum-of-products, as well as product-of-sums expressions (with or without don't cares) for logic functions. I will definitely have a problem on the test about karnaugh maps testing all the above issues that I mentioned.

END OF REVIEW!!