Midterm Examination 1
ECE 302
Spring 2013
Instructor: Prof. Mimi Boutin

Instructions:

1. Wait for the "BEGIN" signal before opening this booklet. In the meantime, read the instructions below and fill out the requested info.
2. You have 50 minutes to complete this exam. **When the end of the exam is announced, you must stop writing immediately**. Anyone caught writing after the exam is over will get a grade of zero.
3. You will find some scratch paper at the end of this booklet. What you write on the scratch paper will not be graded. You may tear out the scratch paper pages **once the exam begins**. Make sure to hand in all your scratch paper when you turn in your exam.
4. You must keep your eyes on your desk at all times. Looking around is not allowed.
5. This is a closed book exam. The use of calculators is prohibited. Cell phones, iPods, and all other electronic communication devices are strictly forbidden. This means that they MUST BE TURNED OFF (not on vibrate mode) and stowed away (in your bag, not in your pocket) AT ALL TIMES.

Name:_____

Email:_____

Signature:_____

Itemized Scores
Problem 1:
Problem 2:
Problem 3:
Problem 4:
Problem 5:
Total:

(25 pts) **1.** Prove the second law of De Morgan:

$$\left(\bigcap_n S_n\right)^c = \bigcup_n S_n^c$$

(25 pts) **2.** You are given three boxes, each with one drawer on each of two sides. (So there are two drawers per box.) Each drawer contains exactly one coin. One box has a gold coin in each of its two drawers. Another box has a silver coin in each of its two drawers. The remaining box has a silver coin in one drawer, and a gold coin in the other drawer. A box is chosen at random, a random drawer is opened, and a gold coin is found inside it. What is the probability that the coin on the other side is gold? (Use conditional probability to justify your answer.)

(15 pts) **3.** The rate of HIV in the US is estimated to be 0.06%. A home HIV test is accurate 95% of the time in detecting people who have HIV, and 92% of the time in detecting people who do not have HIV. If a random person living in the US receives a positive test, what is the probability that this person is truly infected? (You may leave your answer in unsimplified numerical form, but you must justify it in order to get full credit.)

(10 pts) **4.** An ECE department offers 7 lower level courses and 10 higher level courses. A valid curriculum consists of 4 lower level courses and 5 high level courses. How many different curricula are possible? (Leave your answer in unsimplified numerical form.)

(15 pts) **5.** A well-shuffled 52-card deck is dealt to 5 players. What is the probability that each of the players gets a king? (Leave your answer in unsimplified numerical form.)

-SCRATCH -
(will not be graded)

-SCRATCH -
(will not be graded)