Stat355, F 2016, SAMPLE MIDTERM I

1. A factory uses three production lines to manufacture cans of a certain type. The accompanying table gives percentages of nonconforming cans by type of non conformance, for each of the three lines during a particular time period.

	Line 1	Line 2	Line 3
Blemish	15	12	20
Crack	50	44	40
Pull-Tab Problem	21	28	24
Surface Defect	10	8	15
Other	4	8	2

   During this period, line 1 produced 500 nonconforming cans, line 2 produced 400 such cans, and line 3 was responsible for 600 nonconforming cans. Suppose that one of these 1500 cans is randomly selected.

   (a) What is the probability that the can was produced by line 1? That the reason for non-conformance is a crack?

   (b) If the selected can came form line 1, what is the probability that it had a blemish?

   (c) Given that the selected can had a surface defect, what is the probability that it came from line 1?

2. if $P(B|A) > P(B)$, show that $P(B^c|A) < P(B^c)$

3. A manufacturer can buy alloy material from five different supplier. All suppliers claim that their supply has the required percentage of a certain compound that is required for the alloy, but only one supplier truly meet the requirement. The manufacturer has to test each one (sequentially) to verify if the requirement is met. What is the probability that at least three supplier is tested before the correct supplier is found?

4. A box in a supply room contains 15 compact fluorescent light bulbs, of which 5 are rated 13-watt, 6 are rated 18-watt, and 4 are rated 23-watt. Suppose that three of these bulbs are randomly selected

   (a) What is the probability that exactly two of the selected bulbs are rated 23-watt?

   (b) What is the probability that all three of the bulbs have the same rating?

   (c) What is the probability one bulb of type is selected?

   (d) If bulbs are selected one by one until a 23-watt bulb is obtained, what is the probability that it is necessary to examine at least 6 bulbs?

5. For three events A, B and C in the same sample space, let $P(A) = 0.22, P(B) = 0.25, P(C) = 0.28$, $P(A \cap B) = 0.11, P(B \cap C) = 0.07, P(A \cap C) = 0.05$, $P(A \cap B \cap C) = 0.01$. Find the probability of the following events: $A \cup C$, $A^c \cap B^c$, $A \cup B \cup C$, $(A^c \cup B^c) \cap C$

6. ALL PROBLEMS IN HW3