

STAT-324
Midterm I
February 22, 2005
9:30-10:40AM
Instructor: Moo K. Chung

Answer all questions showing all your work **neatly**.
Calculators are allowed. One page note is permitted

Name: _____
Student ID: _____

Pledge: On my honor, I have neither given nor received
unauthorized aid on this examination.

Signature: _____

Question	Points
1	
2	
3	
4	
Total	

1. (a) Suppose that A and B are independent events such that the probability that neither occurs is $\frac{1}{2}$ and the probability of B is $\frac{1}{3}$. Determine the probability of A occurring [5pts].

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- (b) If A and B are independent events, show that A^c and B are also independent [5pts].

2. A lie detector will show a positive reading (indicates a lie) 10% of the time when a person is telling the truth and 90% of the time when the person is lying. Suppose two people are suspects in a crime and only one is guilty. The guilty one will be lying while the innocent one will be telling the truth.

(a) What is the probability that the detector shows positive readings for both suspects [5pts]?

(b) What is the probability that a person is lying when the detector shows a negative reading [5pts]?

3. A man with n keys wants to open his door and tries the keys at random. Exactly one key will open the door.
- (a) Suppose unsuccessful keys are **not eliminated** from n keys. Determine the probability distribution of the number of trials until he opens the door [5pts].

- (b) Suppose unsuccessful keys are **eliminated** from n keys. Determine the probability distribution of the number of trials until he opens the door [5pts].

4. We have a probability density $f(x) = kx^2$ for $0 < x < 1$ and $f(x) = 0$ otherwise.
- (a) Compute the variance and the expected value of the distribution [5pts].

- (b) Determine the 75-th percentile point [5pts].