



**Faculty of Engineering and Technology**  
**Department of Electrical and Computer Engineering**  
**Engineering Probability and Statistics ENEE 2307**

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*Midterm Exam*

Date: Sunday 4/12/2016

Time: 75 minutes

Name:

Student #:

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**Opening Remarks:**

- This is a 75-minute exam. Calculators are allowed. Books, notes, formula sheets, and other aids are not allowed.
- You are required to show all your work and provide the necessary explanations everywhere to get full credit.

**Problem 1** (20 pts):

- a. If a multiple-choice test consists of 5 questions, each with 4 possible answers of which only one is correct. Assume a student just randomly guesses (يتحزر) the correct answer to each questions. What is the probability that the student gets all of them wrong?
- b. A pair of coins are tossed simultaneously and independently. Each coin has a probability 0.55 to be heads (H). What is the probability that the outcomes of the two coins are different?

**Problem 2** (15 pts)

In an experiment to study the relationship of hypertension (الضغط) and smoking habits, the following data are collected:

	<b>Nonsmokers (NS)</b>	<b>Moderate Smokers (MS)</b>	<b>Heavy Smokers (HS)</b>
<b>Hypertension (H)</b>	15%	19%	16%
<b>No-hypertension (NH)</b>	25%	15%	10%

- a. What is the probability that a randomly selected person is a Nonsmoker?
- b. What is the probability that a randomly selected person is both a moderate smoker and experiences hypertension?
- c. If a random person is selected and found to be a heavy smoker, what is the probability that the person is experiencing hypertension?

**Problem 3** (16 pts)

The waiting time, in hours, between successive speeders (المتجاوزين للسرعة) spotted by a radar unit is a continuous random variable with cumulative distribution function

$$F_X(x) = \begin{cases} 0 & x < 0 \\ 1 - e^{-8x} & x \geq 0 \end{cases}$$

- Find the probability of waiting less than 12 minutes between successive speeders?
- What is the average waiting time, in hours, between successive speeders?

**Problem 4** (16 pts):

In testing a certain kind of truck tire, it is found that 25% of the trucks fail to complete the test run without a blowout.

- Find the probability that out of 6 trucks tested, less than two have blowouts.
- How many of the 6 tested trucks would you expect to have blowouts?

**Problem 5** (15 pts)

Suppose that the proportion of colorblind people in a large population is 0.005. Use the normal approximation to calculate the probability that there will be at most 32 colorblind person in a randomly chosen group of 6000 people.

**Problem 6** (18 pts):

Let  $X$  be a random variable representing the time (in years) it takes to develop a software. Suppose that  $X$  has the following probability density function

$$f_X(x) = \begin{cases} kx^2 & 0 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

- Find  $k$  so that this is a valid probability density function
- Compute the probability that it takes more than 1 year to develop the software.
- Find the probability that it will take more than 6 months to develop the software given that it already exceeded 3 months?

*Good Luck*