

Prince of Songkla University
Department of Industrial Engineering, Faculty of Engineering

Midterm Examination: Semester 2**Academic Year: 2004****Date: 23 December 2004****Time: 1.30 – 4.30 PM****Subject: 225-244 Engineering Statistics I****Room: R300****Instruction: Read them carefully**

1. You must write your name and your student ID in every page of the test.
2. All materials are allowed.
3. There are 9 problems and total score is 100 points, work all of them and also show your work clearly and legibly.
4. Answer your questions in this test paper only.

ทจกรดในการสอบ โทษขันด่ำปรบดกในรายวฤษานัน และพักการเรยน 1 ภาคการศีกษา
โทษสูงสุด ให้ออก

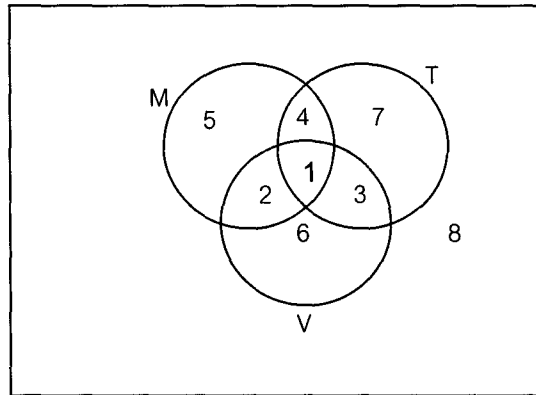
Distribution of Scores

Problem	Points	
1	10	
2	10	
3	15	
4	10	
5	10	
6	10	
7	10	
8	15	
9	10	
รวม	100	

Tests are arranged by
 Napisorn Memongkol



1. Suppose that a family is leaving on a summer vacation in their camper and that M is the event that they will experience mechanical problem. T is the event that they will receive a ticket for committing a traffic violation, and V is the event that they will arrive at a campsite with no vacancies. Referring to the Venn diagram below, list the numbers of the regions that represent the following event; (10 points)



- a) the family will experience no mechanical problems and commit no traffic violation but will find a campsite with no vacancies.

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- b) the family will experience both mechanical problems and trouble in locating a campsite with a vacancy but will not receive a ticket for a traffic violation.

.....

- c) the family will either have mechanical trouble or find a campsite with no vacancies but will not receive a ticket for committing a traffic violation.

.....

- d) the family will not arrive at a campsite with no vacancies.

.....

2. From a sack of fruit containing 3 oranges, 2 apples, and 3 bananas, a random sample of 4 pieces of fruit is selected. If X is the number of oranges and Y is the number of apples in the sample, find

a) the joint probability distribution of X and Y (5 points)

b) $P[(X,Y) \in A]$, where A is the region that given by $\{(x, y) \mid x + y \leq 2\}$
(5 points)

3. Assume random variable X and Y have the following probability density function;

$$f(XY) = xy^3 \quad ; 2 \leq x \leq 3 \quad \text{and} \quad 1 \leq y \leq 2$$
$$= 0 \quad ; \text{otherwise}$$

Find the following questions

a) the marginal probability density function of X and Y (5 points)

b) the condition probability density function of X given Y (5 points)

c) $P(9/4 < x < 5/2 | y = 1/2)$ (5 points)

John J

4. Suppose that a grocery store purchases 5 cartons of skim milk at the wholesale price of \$1.20 per carton and retails the milk at \$1.65 per carton. After the expiration date, the unsold milk is removed from the shelf and the grocery receives a credit from the distributor equal to three-fourths of the wholesale price. If the probability distribution of the random variable X , the number of cartons that are sold from this lot, is

(10 points)

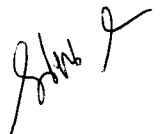
x	0	1	2	3	4	5
f(x)	1/15	2/15	2/15	3/15	4/15	3/15

Find the expected profit.

5. The probability that a student pilot passes the written test for a private pilot's license is 0.7. find the probability that the student will pass the test

a) on the third try (5 points)

b) before the fourth try (5 points)

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6. A car rental agency at a local airport has available 5 Fords, 7 Chevrolets, 4 Dodges, 3 Hondas, and 4 Toyotas. If the agency randomly selects 9 of these cars to chauffeur delegates from the airport to the downtown convention center, find the probability that 2 Fords, 3 Chevrolets, 1 Dodge, 1 Honda, and 2 Toyotas are used? (10 points)

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7. A manufacturer of a certain type of large machine wishes to buy rivets from one of two manufacturers. It is important that the breaking strength of each rivet exceed 10,000 psi. Two manufacturers (A and B) offer this type of rivet. Both have rivets whose breaking strength is normally distributed. The mean breaking strengths for manufactures A and B are 14,000 and 13,000 psi. respectively. The standard deviations are 2000 psi. and 1000 psi. respectively. Which manufacturer will produce, on the average, the fewest number of defective rivets? (10 points)



8. Assume X is normally distributed with a mean of 10 and a standard deviation of 2.
Determine the value for k that solves each of the following

a) $P(X > k) = 0.95$ (5 points)

b) $P(k < X < 10) = 0.2$ (5 points)



c) $P(-k < X-10 < k) = 0.95$

(5 points)

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9. The time between calls to a corporate office is exponentially distributed with a mean of 10 minutes.

a) What is the probability that there are more than three calls in one-half hour?

(5 points)

b) Determine x such that the probability that there are no calls within x hours is 0.01

(5 points)

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