PRINCE OF SONGKLA UNIVERSITY
FACULTY OF ENGINEERING

Final Examination: Semester II — Academic Year: 2005

Date: December,13 2005 — Time: 9:00-12:00

Subject: 225-384 Fundamental of Engineering Statistics — Room: หัวหุ่น

Instructions

- Write your answer in the answer book only, show your work clearly and legibly.
- Write your name and student ID on the answer book.
- This is an opened-book examination.
- There are 9 problems and total score is 100.
- Carefully read the problems and answer all questions in each problem.

ทุจริตในการสอบ โทษขั้นต่ำ คือ พักการเรียน 1 ภาคการศึกษา และปรับตกในรายวิชาที่ทุจริต

Good Luck

Thanate Ratanawilai

Problem 1. (15 points)

(a) A college freshman must take a science course, a social studies course, and a mathematic course. If he may select any of three sciences, any of four social studies, and any of two mathematic courses, how many ways can he arrange his program?

(b) A contractor wishes to build five houses, each different in design. In how many ways can he place these homes on a street if three lots are on one side of the street and two lots are on the opposite site?

(c) In how many ways can two oaks, three pines, and two maples be arranged in a straight line if one does not distinguish between trees of the same kind?

Problem 2. (15 points)

(a) A town has two fire engines operating independently. The probability that a specific fire engine is available when needed is 0.99.

(a1) What is the probability that neither is available when needed?

(a2) What is the probability that a fire engine is available when needed?

(b) A coin is biased so that a head is twice as likely to occur as a tail. If the coin is tossed three times, what is the probability of getting exactly two tails?

Problem 3. (10 points) Suppose that colored balls are distributed in three indistinguishable boxes as follows:

	Box 1	Box 2	Box3
Red	2	4	3
White	3	1	4
Blue	5	3	3

A box is selected at random from which a ball is selected at random and it is observed to be red. What is the probability that box 3 was selected?

Problem 4. (10 points) Find a formula of probability distribution for the number of jazz records when four records are selected at random from a collection consisting of five jazz records, two classical records, and three rock records.

Problem 5. (10 points) Consider the density function

$f(x) = k\sqrt{x}$ $\quad 0<x<1$

$= 0$ $\quad$ elsewhere

(a) Evaluate K

(b) Find F(x) and use it to evaluate $P(0.3 < X < 0.6)$

Problem 6. (10 points) A traffic control engineer reports that 75% of the vehicles passing through a check point are from within the same province. What is the probability that at least three of the next five vehicles are from other provinces?

Problem 7. (10 points) A manufacturing company uses an acceptance scheme on production items before they are shipped. The plan is a two-stage one. Boxes of 25 are readied for shipment and a sample of 3 is tested for defectives. If any defectives are found, the entire box is sent back for 100% screening. If no defectives are found, the box is shipped.

(a) What is the probability that a box containing three defectives will be shipped?

(b) What is the probability that a box containing only one defective will be sent back for screening?

Problem 8. (10 points) Suppose that on the average 1 person in 1000 makes a numerical error in preparing their income tax returns. If 10,000 forms are selected at random and examined, find the probability that 6, 7, or 8 of the forms will be in error.

Problem 9. (10 points) A scientist tests several mice, one at a time, with a disease germ until he finds two that have affected the disease. If the probability of an affected disease is 1/6, what is the probability that eight mice are required?