University of California, Los Angeles
Department of Statistics

Statistics 100A **Instructor: Nicolas Christou**

Exam 1
23 October 2007

Name: _____

Problem 1 (25 points)
Answer the following questions:

a. What is the probability that you and the person sitting next to you have the same birthday?

b. What is the probability that the 52 cards will be divided into 3 piles of 15, 18, and 19 cards each, such that the first pile gets 3 black cards, the second pile gets 10 black cards, and the third pile gets 13 black cards?

c. Five cards will be selected without replacement from the 52-card deck. What is the probability that all five cards are spades?

d. Five cards will be selected without replacement from the 52-card deck. What is the probability that we get 2 aces, 2 tens, and one five?

e. A box contains 2 apples, 2 oranges, 2 nectarines, 2 peaches, and 2 pears. Three fruits are selected at random without replacement. Find the probability that among the three at least 1 is an apple.

Problem 2 (25 points)
Bowl B_1 contains 3 white and 9 green chips. Bowl B_2 contains 8 white and 4 green chips. Bowl B_3 contains 10 white and 2 green chips. A card is drawn from an ordinary 52-card deck. If a face card is drawn (king, queen, jack), a chip is selected from bowl B_1. If an ace is drawn, a chip is selected from bowl B_2. If any other card is drawn, a chip is selected from bowl B_3.

a. What are the prior (unconditional) probabilities of selecting each bowl?

b. Compute the probability of selecting a white chip.

c. Suppose a bowl was selected and handed to you without you being told which bowl you hold. If you select a white chip from this bowl, what is the posterior (conditional) probability that you were handed bowl B_1, B_2, B_3?

Problem 3 (25 points)
A discrete random variable has the following probability:

X	$P(X)$
-3	$\frac{1}{4}$
-1	$\frac{1}{8}$
0	$\frac{3}{8}$
2	$\frac{1}{8}$
3	$\frac{1}{8}$

Answer the following questions:

a. Find $E(X)$.

b. Find $Var(X)$.

c. Use (a) and (b) to compute $E(2X - 3X^2)$.

d. Find $P(X = 0|X < 2)$.

Problem 4 (25 points)

Part A:

A player will play the roulette game and will bet \$40 on a single number that pays 35 to 1. What is his expected profit and variance.

Part B:

A player will play the roulette game 40 times and will bet each time \$1 on a single number that pays 35 to 1. What is his expected profit and variance.

Part C:

The events A, B of an experiment are mutually exclusive with probabilities $P(A) = 0.5, P(B) = 0.3$. The experiment is performed independently until one of the two events will occur. What is the probability that event A will occur before event B.