

Math 1431 – Summer 2003 – Test #3

NAME _____

You are allowed to use your calculator. Show how you used the calculator to the questions below. Explain all answers – answers with no explanation will receive only one-half credit. Use complete sentences.

1. (20 points). Suppose you randomly answer a multiple choice test with 30 questions (each independent of each other). Suppose that each question has five possible answers only one of which is correct. Answer the following:

- Find the mean and standard deviation for the number of correct answers.
- What is the probability of answering more than 12 questions correctly?
- What is the probability of answering less than 15 questions correctly?
- What is the probability of answering exactly 15 questions correctly?

2. (10 points). Seven chips marked 0, 1, 2, 3, 4, 5, 6 are placed in a box. Two chips are chosen randomly from the box. Let event A be the event that the first chip chosen is odd and event B be the event that the second chip is odd. The first chip is not replaced.

- Find $P(A)$, $P(B)$ [extra credit: find $P(A \text{ or } B)$ and $P(A \text{ and } B)$]
- Are A and B independent? Explain.

3. (15 points). Seven chips marked 0, 1, 2, 3, 4, 5, 6 are placed in a box. Two chips are chosen randomly from the box. Let event A be the event that the first chip chosen is odd and event B be the event that the second chip is odd. The first chip is replaced.

- Find $P(A)$, $P(B)$, $P(A \text{ or } B)$ and $P(A \text{ and } B)$.
- Are A and B independent? Explain.

4. (15 points). Two fair six-sided dice are tossed. Event A is the toss of a five on at least one die. Event B is sum of seven on the toss of both die. Find the following:

- $P(A)$, $P(B)$, $P(A|B)$, $P(B|A)$.
- Are A and B independent?

5. (30 points). The table below shows the preference of cola of different age groups:

	Under Age 15	Ages 15-25	Ages 25-35	Total
Cola 1	150	100	200	450
Cola 2	300	125	200	625
Cola 3	300	200	300	800
Total	750	425	700	1875

- Find the probability that a randomly chosen person prefers Cola 1.
- Find the probability that the age of a randomly chosen person is between 15 and 25.
- Find the probability that the age of a randomly chosen person is between 15 and 35.
- Find the probability that a randomly chosen person prefers Cola 3 given that the person is between 15 and 25 years old.
- Find the probability that a randomly chosen person is under 15 years old given that s/he prefers Cola 1.
- Is the age of individuals and the cola preference independent? Explain using the definition of independence.

6. (10 points). The mean and standard deviation of a random sample of 30 students' IQ at a certain college are 120.3 and 10.5 respectively. Find the 90%, 95% and 99% confidence intervals for the average IQ for all students in the school.