

**Midterm Examination #2**  
Math 305 - Chance  
Tuesday, November 24, 1998

**§1 Computation:**

1. Find the correlation coefficient of the following numbers

$x$	$y$
1	5
1	3
1	5
1	7
2	3
2	3
2	1
3	1
3	1
4	1

2. A five-card poker hand is dealt. What are the chances that the first four cards are aces and the fifth card is a king?

**§2 Comprehension:**

3. What is the law of averages? Explain, with examples.
4. What is the central limit theorem? Explain its usefulness with an example.
5. Studies find a negative correlation between the number of hours spent watching television and scores on reading tests. What does this mean? What conclusions can you draw about the effects of watching television on reading scores?
6. "Evolution is driven from less developed species to more developed species." True or false, and explain.

**§3 Applications:**

7. In a study of 1993 Math SAT scores, the Educational Testing Service computed the average score for each of the 51 states, and the percentage of high-school seniors who took the test. (For this purpose, the District of Columbia was counted as a state.) The correlation coefficient between these two variables was  $-0.86$ .
- True or False: test scores tend to be lower in the states where a higher percentage of students take the test. If true, how do you explain this? If false, what accounts for the negative correlation.
  - In New York, the average score was only 471, while in Wyoming the average score was 507. True or false, and explain: the data show that the schools in Wyoming are doing a better job of teaching than the schools in New York.

8. A large group of people get together. Each person rolls a die 180 times, and counts the number of aces (ones). What percentage of people should get counts in the range 15 to 45?
9. If you play roulette 10,000 times, always betting \$1 on a single number (which pays 35 to 1), how much money would you expect to win or lose? What is the probability that you will turn a profit?
10. In his novel *Bomber*, Len Deighton argues that a World War II pilot had a 2% chance of being shot down on each mission. The commander wants each pilot to fly as many missions as possible before their discharge. However, to keep up morale, wants to make sure that each pilot has at least a 50% chance of being discharged without being shot down on a mission. How many missions should he assign to each pilot?