

Homework 7 - Due November 7, 2012

- (Section 9.1, Problem 2) Let S_{200} be the number of heads that turn up in 200 tosses of a fair coin. Estimate
 - $P(S_{200} = 100)$.
 - $P(S_{200} = 90)$.
 - $P(S_{200} = 80)$.
- (Section 9.1, Problem 14) A restaurant feeds 400 customers per day. On the average 20 percent of the customers order apple pie.
 - Give a 95% confidence interval for the number of pieces of apple pie ordered on a given day. (You can assume, on this problem and the next, that $N(-2,2)$ is exactly 0.95.)
 - How many customers must the restaurant have, on the average, to be at least 95% sure that the number of customers ordering pie on that day falls in the 19 to 21 percent range?
- (Section 9.1, Problem 8) A club serves dinner to members only. They are seated at 12-seat tables. The manager observes over a long period of time that 95 percent of the time there are between six and nine full tables of members, and the remainder of the time the numbers are equally likely to fall above or below this range. Assume that each member decides to come with a given probability p , and that the decisions are independent. How many members are there? What is p ?
- Moose are sampled to estimate the proportion of male moose in a wildlife refuge. Find a sample size such that the probability of a sampling error less than 0.005 will be 99% or greater.
- Suppose you have a random walker who starts at 0 on the x -axis. This man makes steps of size 2 with probability 0.1, size 1 with probability 0.3, size 0 with probability 0.3, or size -1 with probability 0.3.
 - What is the probability that after 100 steps, the man is not on the positive side of the x -axis (so that his position is ≤ 0)?
 - What is the probability that after 100 steps, the man is in a position between 0 and 30?

(continued on next page)

6. A biologist wants to estimate ℓ , the life expectancy of a certain type of insect. To do so, she takes a sample of size n and measures the lifetimes from birth to death of each insect. Then she finds the average of these numbers. If she believes that the lifetimes of these insects are independent random variables with variance 1.5 days, how large a sample should she choose to be 98% sure that her average is accurate to within ± 0.2 days according to the Central Limit Theorem?
7. Complete Problem 33 in Probability Online. See the notes about Matlab's "normcdf" and "norminv" functions, located on the Homework section of our website next to the Homework 7 link.

Practice problems NOT to turn in: 9.1.1, 9.1.5, 9.1.6, 9.2.1, 9.2.3, 9.2.6 (except part c). Also Probability Online, Problem 32.