

Math 20: Homework
The Central Limit Theorem
Friday, November 7, 2003

Problem 1 Find a number a such that, for large n , the inequality $|S_n^*| > a$ has probability $\frac{1}{2}$.

Problem 2 In 1000 coin flips, the probability is about $\frac{1}{2}$ that the number of heads ranges in what interval? In 1000 throws of a die, the probability is about $\frac{1}{2}$ that the number of “6”s ranges in what interval? Use Problem 1.

Problem 3 Find a number k such that the probability is about 0.5 that the number of heads obtained in 1000 tossings of a coin will be between 490 and k .

Problem 4 An unknown fraction of a certain population are overweight, and random sampling with replacement is to be used to determine p . Determine how large a sample will ensure that the estimate will, with probability .95, be correct to within .005. What if we reduced our requirement to an accuracy within .045?

Problem 5 Twelve percent of the population is left-handed. Approximate the probability that there are at least 20 left-handed students in a school of 200 students.

Problem 6 One thousand independent rolls of a fair die will be made. Compute an approximation to the probability that “6” will appear between 150 and 200 times inclusively. If “6” appears exactly 200 times, find the probability that “5” appears less than 150 times.

References: course textbook, *An Introduction to Probability Theory and Its Applications* by William Feller, and *A First Course in Probability* by Sheldon Ross