

Intro Statistics — Exam II — Spring 2003

Show all work clearly for partial credit. In particular, write down any difficult computations before you perform them, so that, if you make a mistake, you have at least displayed your understanding of the process. An unevaluated expression is worth more than the numerical answer without explanation.

1. (20 points) Frank programs his computer to display a picture when it is first turned on. The picture is chosen at random from a folder which contains 7 pictures of tan lions, 4 pictures of guitars (two tan, one black and one red), and 2 pictures of grey donkeys.
 - a) What is the chance that the first picture picked is a lion?
 - b) What is the chance that the first picture picked is tan or an animal?
 - c) What is the chance that that two consecutive pictures are of different objects?
 - d) Find the chance that at least one of the first seven pictures is a donkeys.
 - e) During one particular week, Frank notices that five of the seven pictures chosen was of a guitar. What is the chance that a guitar picture would be selected exactly five of the seven days?
 - f) Using a normal approximation, find an estimate for the chance of a guitar picture on exactly five of the seven days.
2. (10 points) Companies in the fiercely competitive tiddly-winks industry offer three types of retirement plans. Seven of the companies have no early retirement and a retirement age of 65. Twenty-seven offer early retirement at age 62, and fifteen offer early retirement starting at age 60. Write a box model to describe the following processes.
Show the box (with labeled tiles and number of tiles) and n the number of draws. You do not need to do more than that.
 - a) Randomly selecting 25 companies in the tiddly-wicks industry and finding the average earliest allowed retirement age.
 - b) Randomly selecting 15 such companies and counting the number with no early retirement.
3. (5 points) Wendy wants to do a nationwide survey of the average income of the parents of incoming college freshmen. She asks her friends who have gone to college to find the information for their colleges. These colleges are Colgate, Dartmouth and Princeton. She concludes from this data that the average income of the parents of incoming college freshmen is about \$100,000. What is wrong with his analysis?

4. (20 points) Someone rolls 100 special four sided die. The sides are numbered 1 through 4 and are all equally likely to be rolled.
 - a) What is the expected sum of the rolls with error estimate?
 - b) What is the expected number of dice rolling a 1, with error estimate?
 - c) What is the expected average of the rolls, with error estimate?
 - d) What is the expected percentage of the dice rolling a 1, with error estimate?
5. (15 points) 528 people get together. Each one draws 344 times at random with replacement from a box that has 1 red and 3 green balls. About what percentage of these people should get between 84 and 94 red marbles? Show your work.
6. (20 points) A marketing survey collects responses by 900 households chosen at random from a city. Questions are asked about the number of pets in the household, and the average household income. Suppose the survey results are that the sample showed 448 households with pets. In addition, the average income of the surveyed households is \$43,000 and the SD of the survey results for income is \$8,400. Answer the following questions; if there is not enough information, write the formula you would use and explain what additional information you would need.
 - a) Estimate the average household income for this city based on the survey results (with error estimate).
 - b) Estimate the percentage of households with pets in this city (with error estimate).
 - c) Find a 95% confidence interval for the average household income for this city.
 - d) Correct your answer to part a) if the population of the city is only 1799 people.
7. (10 points) Related to the article “What is the chance of your being guilty” by John Kay, how is understanding of contingent [i.e., conditional] probability of crucial importance to the case of Sally Clark?