

MATH 254 – Test 3

30 April 2009

You must show all your work to receive full credit. You may use a calculator or Excel for routine calculations. However, your written work should make clear what calculations Excel or your calculator is performing. The total number of points on this test is 100. GOOD LUCK!

1) (15 points) You are conducting a poll to see whether or not people believe that the government is taking effective steps to combat the recent outbreak of swine flu. Describe what you would do to ensure that your poll has both low bias and low variability.

2) (10 points) A study reveals that, due to factory imperfections, the probability is 0.2 percent that a certain toy made by a certain manufacturer is defective. In your own words, what does this mean?

3) (25 points) A committee consists of three people. The committee must vote on whether or not to allow smoking in public areas. It is known 25% of people believe that it should be allowed.

a) Let the random variable X be the number of committee members who are in favor of permitting smoking in public areas. Determine the probability distribution for X .

b) What is the probability that a majority of the committee is in favor of permitting smoking in public areas?

4) (25 points) We define a game as follows: You ask Excel for a random number (which we know must be between 0 and 1). We then examine the first digit to the right of the decimal point. If this digit is a 0, you win \$5. If this digit is a 1 or 2, you win \$2. If this digit is a 3, 4, or 5, you win \$1. Otherwise, you lose \$3. On average, how much money do you win or lose per play of this game?

5) (25 points) In a prison population, inmates are categorized as being convicted of either a violent or non-violent crime (but not both) and are also categorized by gender. Suppose that 65% of inmates are male, that 70% of the inmates were convicted of non-violent crimes, and that 10% of the inmates are females convicted of a violent crime.

a) Draw a Venn diagram that illustrates the information given in this problem.

b) Find the probability that a particular inmate is male and convicted of a violent crime.

c) Find the probability that a particular inmate is male, given that he/she was convicted of a violent crime.

d) Are the events “inmate is male” and “inmate was convicted of a violent crime” independent or not? Explain.