

Math 102

Project 3 Handout

Due: By 4:00pm on Wednesday 11/19/2008

Instructions: This project is designed to give you an opportunity to explore some additional concepts from counting and probability. Complete as much of this project as you can by the due date. You should write up your solutions neatly and all pertinent work leading up to your solution should be included as well. Make sure that you show enough detail in your computations that I can see how you arrived at your answers. If you consult any references (books or online material), cite the relevant sources either in footnotes, or at the end of your project.

1. Remember the slot machine from a previous worksheet whose first wheel has 3 cherries, 5 oranges, 2 bars, 4 bells, and 6 pears, second wheel has 5 cherries, 7 oranges, 4 bars, 1 bell, and 3 pears, and third wheel has 1 cherry, 6 oranges, 2 bars, 3 bells, and 8 pears.
 - (a) (4 points) Recall that to win on this slot machine, you need to get 3 matching symbols when the wheels come to rest. Compute the probability of getting 3 Cherries, the probability of getting 3 Oranges, the probability of getting 3 Bars, the probability of getting 3 Bells, and the probability of getting 3 Pears.
 - (b) (4 points) It costs \$1 for each spin on this slot machine. The payouts for this slot machine are as follows: 3 Oranges pays \$5, 3 Pears pays \$10, 3 Cherries pays \$100, 3 Bars pays \$100, and 3 Bells pays \$100. Find the expected value for playing this slot machine [Hint: What is the probability of losing?].
2. The State of Minnesota's "Gopher 5" lottery works as follows: 47 balls with the numbers 1 through 47 printed on them are placed in a drum and 5 of them are drawn (without replacement). To play, before the drawing, and player pays \$1 for the right to try to predict the results of the drawing by choosing 5 numbers.
 - (a) (2 points) Find the total number of possible outcomes for the Gopher 5 drawing process.
 - (b) (2 points) A player wins the jackpot by correctly picking all 5 white numbers. Find the probability of winning the jackpot.
 - (c) (3 points) Find the probability of the following other ways to win when playing Gopher 5 (you must show your work in order to receive credit for this part of the project):
 - i. Correctly picking exactly 4 numbers correctly (successfully doing this pays \$500)
 - ii. Correctly picking exactly 3 numbers correctly (successfully doing this pays \$15)
 - iii. Correctly picking exactly 2 numbers correctly (successfully doing this pays \$1)
 - (d) (3 points) The current Gopher 5 jackpot value is \$275,000. Find the expected value for playing, given the current jackpot and the payouts listed above.
 - (e) (2 points) How big would the jackpot have to be in order to make playing Gopher 5 a fair game?