**`HW #4: Extra credit Due December 2**

**Robertas:** This is an extra credit assignment and thus it is not mandatory. It may help you earn some extra points. One of my students applied for a business analyst’s position and the student was given this assignment. I thought it might be an interesting exercise for you. Below the black solid line is what the company gave to the student. I am giving you to work until December 2. Since this is an extra credit assignment, you are not allowed to work on this assignment with your classmates nor receive any help from anybody. You can use R, Python, Excel, … - any software that you want if you need to.

Submit this file with your answers below each question and any other form of solutions whether it is code or excel spreadsheet, etc.

***Instructions:*** *Please complete the below test in 60- 90 minutes, referencing the companion worksheets. Answer each question in text and, as applicable, using spreadsheets,* ***showing as much work as possible****. If you have a question about anything, please just make a reasonable assumption, making sure to clearly state all such assumptions.*

1. *(Suggested time: 10-15 minutes)* You are competing against someone in Backgammon\*, in which players take turns rolling two standard dice and move two pieces across the board a number of spaces equal to the roll of each die. Rolling doubles (the same number on each die) allows a player to move 4 board pieces instead of the usual 2, and assume that being able to move 4 pieces is better that moving 2 pieces in your situation. Assume that you have bet me $100 on the outcome of this game. It is your turn and you need to roll double-threes or better to win the game on this turn. If you do not win on this turn, I am guaranteed to win on my next roll. How much money would you offer me to call the game, and the bet, off right now?  
   \* Note that prior knowledge of backgammon is not needed for this question

Probability of winning = probability of rolling double-threes or better = 1/6 \* 1/6 + 1/6 \* 1/6 + 1/6 \* 1/6 = 0,0833

Hence my expected payoff if I play is 100$ with p=0,0833 and -100$ with probability p=1-0,0833

Eu(playing) = 100\*0,0833 – 100\*(1-0,0833) = 8,33 - 91,67 = -83,34$

Hence I would be willing to pay you anything < 83,34$ to call off the bet and hence I would be potentially losing less money than if I decided to play.

1. *(Suggested time: 10-15 minutes)* Sales of RedShoe.com’s products follow a peculiar, but predictable, pattern that determines how many units will sell in any given year. Based on the sales history below (also in the companion workbook), which color will sell the most units in 2002? Which will sell the most in the combined 2002-2004 time period?

Yellow will sell most units in 2002 (40 units) and purple during 2002-2004 period (74 units).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Unit Sales | | | | | | | | | | | | |
| Shoe Color | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
| Red | 28 | 42 | 21 | 23 | 29 | 15 | 8 | 4 | 2 | 1 | discontinued | |
| Green |  |  |  | 26 | 39 | 20 | 22 | 28 | 14 | 7 | 4 | 2 |
| White |  |  |  |  |  | 43 | 65 | 33 | 36 | 45 | 23 | 12 |
| Brown |  |  |  |  |  |  |  | 58 | 87 | 44 | 48 | 60 |
| Yellow |  |  |  |  |  |  |  |  | 37 | 56 | 28 | 31 |
| Black |  |  |  |  |  |  |  |  |  | 28 | 42 | 21 |
| Orange |  |  |  |  |  |  |  |  |  |  | 19 | 29 |
| Purple |  |  |  |  |  |  |  |  |  |  |  | 24 |
| Total | 28 | 42 | 21 | 49 | 68 | 78 | 95 | 123 | 176 | 181 | 164 | 179 |

1. *(Suggested time: 40-60 minutes)* ProLobsters is a direct-from-the-ocean shipper of fresh Maine lobsters to consumers throughout the United States. All orders are shipped FedEx Overnight or 2ndDay on the date requested by the customer. ProLobsters acquires new customers with daily spots on the Food Channel, and also enjoys a brisk repeat business. Three times each month, ProLobsters sends an e-mail to its entire customer base containing special offers. July sales data is detailed in the companion workbook, and the e-mail drop dates are highlighted in blue. Using this information, create a forecast for August daily orders, shipments, new customers, and retention orders.