Business Decision Analytics under Uncertainty
Fall 2017, Professor Eckstein
Homework 3

Due Wednesday, October 4

Show your work for each problem.

Q1: Stocking Appliances

You operate a local chain of appliance stores that carries Bueschle high-end dishwashers. You purchase these dishwashers from the manufacturer for $800 each and sell them for $1,100 each. Bueschle has just informed you that it is now your last opportunity to order their 2017 dishwasher model; the 2018 model will be released on January 1st. You anticipate the demand for the dishwashers between now and January 1st to follow the distribution below:

Dishwashers	Probability
6	2%
7	5%
8	10%
9	15%
10	20%
11	15%
12	15%
13	10%
14	5%
15	3%

Once the 2018 model is released, you plan to drop the price of the 2017 dishwashers to $700, in order to rapidly clear them from your inventory (they should all sell quickly at that price). Suppose that you have none of the dishwashers in stock at present. How many more 2017 dishwashers should you order in order to maximize your expected profit for the remainder of the year?

Q2: Stocking Newspapers

Problem 2 on page 141 of the textbook.

Q3: Staffing

An online shipping warehouse pays each of its order pickers $250 per day. The anticipated need for order pickers tomorrow is given by the distribution at the top of the next page, and you are trying to decide how many order pickers to ask to come in to work tomorrow. If the number you ask to come in to work is lower than the number you end up needing, you must fill the labor shortfall by paying other employees "time and a half" pay, the equivalent of $375 per day. If you have more pickers than you end up needing, you can use the extra pickers to perform cleanup work. One day's work cleanup work by one person saves you $175 that you would

otherwise have to pay to an outside contractor. To maximize your operating profit, how many pickers should you ask to come into work tomorrow?

Pickers Needed	Probability
6	18%
7	19%
8	23%
9	17%
10	13%
11	10%

Q4: Medication Stocks

Tucson General Hospital sometimes has to treat people bitten by rattlesnakes. In the past 15 years, they have observed the following numbers of rattlesnake-bite cases:

Year	Number of Cases
2001	4
2002	8
2003	9
2004	2
2005	3
2006	4
2007	12
2008	8
2009	4
2010	3
2011	5
2012	10
2013	11
2014	6
2015	7

At the beginning of each year, the hospital has the opportunity to pre-order rattlesnake anti-venom kits at cost of $350 each. Treating each snake-bite case requires one anti-venom kit. The kits expire after one year, after which any unused kits must be disposed of at a cost of $10 each. If the hospital runs out of pre-ordered anti-venom kits before the end of the year, it may immediately obtain a functionally equivalent packet of medications from a local pharmacy, but the cost is $500 per case treated.

Assuming the past data presented above are representative of the number of snake-bite cases that may be expected in the future, how many anti-venom kits should the hospital pre-order each year?