Simulation Homework Assignment

ITOM 3306

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Dates, Unlimited sells photo calendars from a mall kiosk for 3 months each year. They buy the calendars from the manufacturer for $5.50 each, and sell them for $10.00. Any unsold calendars can be sold to a liquidator for $2.50 each at the end of the 3 month season. Demand for calendars follows a discrete probability distribution with possible demand during the 3-month season being 1000, 1500, 2000, 2500, and 3000 calendars with corresponding probabilities .3, .2, .25, .2, and .05. Dates Unlimited wishes to use simulation to estimate their profit under five different scenarios. Specifically they wish to consider five different order quantities: 1000, 1400, 1800, 2200, and 2600.

1. Define a mapping from the interval [0,1) to demand for calendars.
2. Perform a by-hand simulation for Dates, Unlimited using your mapping and the random numbers taken from column #1 of the random number table (page 720) in your book. (So the first few numbers are .69,.00,.67, etc.) “Run” your by-hand simulation 20 times for an order quantity of 1800. What are average annual sales for your 20 runs? (Hint: You'll probably want to keep track of your simulation in a table with column headings for "Year", "2-digit Random #", "Demand", "# of Calendars Sold", "Income from Sales", "Income from liquidation", and "Profit".)
3. Create an Excel spreadsheet to model this situation. In your model be sure to include cells to show

the order quantity selected,

simulated demand,

number of calendars sold for $10,

total cost of calendars,

income from retail sales,

number of calendars liquidated,

income from liquidation, and

total profit.

1. Run your model 20 times for each of the five order quantities. For each order quantity estimate the annual profit Dates, Unlimited will make from sales of calendars by computing the average profit for that order quantity. Based on this analysis, ***which order quantity would you recommend*** to Dates, Unlimited?

Optional Challenge:

1. Modify your model to allow Dates, Unlimited to hold a sale in this way: Any unsold calendars may be sold at a 50% discount (i.e. for $5. each). The demand for discounted calendars follows a normal distribution with mean = 1500, and standard deviation = 500. Any calendars remaining unsold after the sale are sold to the liquidator for $2.50 as before. Run this revised model 20 times for each possible order quantity. Estimate the average annual profit/loss at each order quantity. ***What order quantity would you recommend*** based on your results? Estimate the additional profit Dates, Unlimited makes, at this recommended order quantity, by holding a sale.

Note: To generate a random sample from a Normal Distribution with mean=M and standard deviation=S, you may use this formula in Excel: =NORMINV(RAND(),M,S)