ISQA 8160 Exam I Due: July 19

1. Laura Naples, Manager of Heritage Inn, periodically collects and tabulates information about a sample of the hotel’s overnight guests. This information aids her in planning and scheduling decisions she must make. The table below lists data on ten randomly selected hotel registrants, collected as the registrants checked out. The data listed for each registrant are: number of people in the group; birth date of person registering; shuttle service used, yes or no; total telephone charges incurred; and reason for stay, business or personal.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name of  Registrant | People  In Group | Birth  Date  (mm/dd/yy) | Shuttle  Used | Telephone  Charges | Reason  For Stay |
| Adam Sandler | 1 | 05/07/59 | yes | $0.00 | personal |
| Mica Pepper | 4 | 11/23/48 | no | 12.46 | business |
| Claude Shepler | 2 | 04/30/73 | no | 1.20 | business |
| Amy Rodriquez | 2 | 12/16/71 | no | 2.90 | business |
| Tony DiMarco | 1 | 05/09/39 | yes | 0.00 | personal |
| Amy Franklin | 3 | 09/14/69 | yes | 4.65 | business |
| Tammy Roberts | 2 | 04/22/66 | no | 9.35 | personal |
| Ed Blackstone | 5 | 10/28/54 | yes | 2.10 | personal |
| Mary Silverman | 1 | 11/12/49 | no | 1.85 | business |
| Todd Atherton | 2 | 01/30/62 | no | 5.80 | business |

|  |  |
| --- | --- |
| a. | How many elements are there in the data set? |
| b. | How many variables are there in the data set? |
| c. | How many observations are there in the data set? |
| d. | What are the observations for the second element listed? |
| e. | What is the total number of measurements in the data set? |
| f. | Which variables are quantitative? |
| g. | Which variables are qualitative? |
| h. | What is the scale of measurement for each of the variables? |
| i. | Does the data set represent cross-sectional or times series data? |
| j. | Does the data set represent an experimental or an observational study? |

2. Missy Walters owns a mail-order business specializing in baby clothes. She is considering offering her customers a discount on shipping charges based on the dollar-amount of the mail order. Before Missy decides the discount policy, she needs a better understanding of the dollar-amount distribution of the mail orders she receives. Missy had an assistant randomly select 50 recent orders and record the value, to the nearest dollar, of each order as shown below.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 136 | 281 | 226 | 123 | 178 | 445 | 231 | 389 | 196 | 175 |
| 211 | 162 | 212 | 241 | 182 | 290 | 434 | 167 | 246 | 338 |
| 194 | 242 | 368 | 258 | 323 | 196 | 183 | 209 | 198 | 212 |
| 277 | 348 | 173 | 409 | 264 | 237 | 490 | 222 | 472 | 248 |
| 231 | 154 | 166 | 214 | 311 | 141 | 159 | 362 | 189 | 260 |

|  |  |
| --- | --- |
| a. | Determine the mean, median, and mode for this data set. |
| b. | Determine the 80th percentile. |
| c. | Determine the first quartile. |
| d. | Determine the range and interquartile range. |
| e. | Determine the sample variance, sample standard deviation, and coefficient of variation. |
| f. | Determine the *z*-scores for the minimum and maximum values in the data set. |

3. over the past 200 days:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Number of | Number |  |
|  | Houses Sold | of Days |  |
|  | 0 | 60 |  |
|  | 1 | 80 |  |
|  | 2 | 40 |  |
|  | 3 | 16 |  |
|  | 4 | 4 |  |

|  |  |
| --- | --- |
| a. | How many sample points are there? |
| b. | Assign probabilities to the sample points and show their values. |
| c. | What is the probability that the agency will not sell any houses in a given day? |
| d. | What is the probability of selling at least 2 houses? |
| e. | What is the probability of selling 1 or 2 houses? |
| f. | What is the probability of selling less than 3 houses? |

4. A very short quiz has one multiple-choice question with five possible choices (a, b, c, d, e) and one true or false question. Assume you are taking the quiz but do not have any idea what the correct answer is to either question, but you mark an answer anyway.

|  |  |
| --- | --- |
| a. | What is the probability that you have given the correct answer to both questions? |
| b. | What is the probability that only one of the two answers is correct? |
| c. | What is the probability that neither answer is correct? |
| d. | What is the probability that only your answer to the multiple-choice question is correct? |
| e. | What is the probability that you have only answered the true or false question correctly? |

5. A government agency has 6,000 employees. The employees were asked whether they preferred a four-day work week (10 hours per day), a five-day work week (8 hours per day), or flexible hours. You are given information on the employees' responses broken down by gender.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Male | Female | Total |
|  | Four days | 300 | 600 | 900 |
|  | Five days | 1,200 | 1,500 | 2,700 |
|  | Flexible | 300 | 2,100 | 2,400 |
|  | Total | 1,800 | 4,200 | 6,000 |

|  |  |
| --- | --- |
| a. | What is the probability that a randomly selected employee is a man and is in favor of a four-day work week? |
| b. | What is the probability that a randomly selected employee is female? |
| c. | A randomly selected employee turns out to be female. Compute the probability that she is in favor of flexible hours. |
| d. | What percentage of employees is in favor of a five-day work week? |
| e. | Given that a person is in favor of flexible time, what is the probability that the person is female? |
| f. | What percentage of employees is male and in favor of a five-day work week? |

6. Assume you have applied for two scholarships, a Merit scholarship (M) and an Athletic scholarship (A). The probability that you receive an Athletic scholarship is 0.18. The probability of receiving both scholarships is 0.11. The probability of getting at least one of the scholarships is 0.3.

|  |  |
| --- | --- |
| a. | What is the probability that you will receive a Merit scholarship? |
| b. | Are events A and M mutually exclusive? Why or why not? Explain. |
| c. | Are the two events, A and M, independent? Explain, using probabilities. |
| d. | What is the probability of receiving the Athletic scholarship given that you have been awarded the Merit scholarship? |
| e. | What is the probability of receiving the Merit scholarship given that you have been awarded the Athletic scholarship? |
| e. | 7. The probability distribution of the daily demand for a product is shown below.   |  |  |  |  | | --- | --- | --- | --- | |  | Demand | Probability |  | |  | 0 | 0.05 |  | |  | 1 | 0.10 |  | |  | 2 | 0.15 |  | |  | 3 | 0.35 |  | |  | 4 | 0.20 |  | |  | 5 | 0.10 |  | |  | 6 | 0.05 |  |  |  |  | | --- | --- | | a. | What is the expected number of units demanded per day? | | b. | Determine the variance and the standard deviation. |   8. A retailer of electronic equipment received six VCRs from the manufacturer. Three of the VCRs were damaged in the shipment. The retailer sold two VCRs to two customers.   |  |  | | --- | --- | | a | Can a binomial formula be used for the solution of the above problem? | | b. | What kind of probability distribution does the above satisfy, and is there a function for solving such problems? | | c. | What is the probability that both customers received damaged VCRs? | | d. | What is the probability that one of the two customers received a defective VCR? | |