KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
Term 152

Exam 3

STAT 211 BUSINESS STATISTICS I

Wednesday April 20, 2016 Serial number

Please circle your instructor name:

W. Al- Sabah M. Saleh

Name: _____ ID #:_____

Important Note:

- Show all your work including formulas, intermediate steps and final answer

Question No	Full Marks	Marks Obtained
1	7	
2	3	
3	2	
4	2	
5	4	
6	6	
Total	24	

Q1: If a contractor's profits on a construction job can be looked upon as a continuous random variable having the probability distribution

$$f(x) = c(x+1) \quad -1 < x < 5$$

Where the units are $ 1000,

a. Find the value c that makes $f(x)$ a probability distribution function. (2 pts.)

b. Find the probability the contractor loses money. (2 pts.)

c. Find the expected profit. (3 pts.)

Q2: A brokerage survey reports that 30 percent of individual investors have used a discount broker, i.e. one which does not charge the full commission. In a random sample of 9 individuals,

a. What is the probability that exactly two of the sampled individuals have used a discount broker? (1 pt.)

b. What is the probability that at least two of the sampled individuals have used a discount broker? (2 pts.)

Q3: (2 pts.) You are a financial analyst facing the task of selecting bond mutual funds to purchase for a client's portfolio. You have narrowed the funds to be selected to ten different funds six of which are short-term corporate bond funds. In order to diversify your client's portfolio, you will recommend the purchase of four different funds. What is the probability that of the four funds selected, at most one short-term corporate bond fund?

Q4: (2 pts.) Past experience says that the average life of a bulb (assumed to be a continuous random variable following exponential distribution) is 110 hours. Calculate the probability that the bulb will work more than 220 hours.

Q5: (4 pts.) A company manufactures 50,000 light bulbs a day. For every 1,000 bulbs produced there are 50 bulbs defective. Consider testing a random sample of 400 bulbs from today's production. Approximate the probability that the sample contains at least 33 defective bulbs.

Q6: The amount of time a bank teller spends with each customer has a population mean 3.10 minutes and a standard deviation 0.40 minute. If you select a random sample of 36 customers,

a. What is the probability that the mean time spent per customer is at least 3 minutes? (3 pts.)

b. There is an 85% chance that the sample mean is less than how many minutes? (3 pts.)

Some Useful Formulas

- $\boldsymbol{\mu = E(X) = \sum_{i=1}^{n} x_i\, P(X = x_i)}$, $\boldsymbol{or}$ $\boldsymbol{\mu = E(X) = \int x\, f(x)\, dx}$
- $\boldsymbol{\sigma^2 = E(X^2) - E(X)^2}$,
- $\boldsymbol{P(X = x) = C_x^n\, \pi^x\, (1-\pi)^{n-x}}$, $\boldsymbol{x = 0, 1, \dots, n}$, $\boldsymbol{\mu = n\pi}$ & $\boldsymbol{\sigma = \sqrt{n\pi(1-\pi)}}$
- $\boldsymbol{P(X = x) = \frac{(\lambda t)^x\, e^{-\lambda t}}{x!}}$, $\boldsymbol{\mu = \lambda t}$ & $\boldsymbol{\sigma = \sqrt{\lambda t}}$
- $\boldsymbol{P(X = x) = \frac{C_x^X\, C_{n-x}^{N-X}}{C_n^N}}$, $\boldsymbol{\mu = \frac{nX}{N}}$ & $\boldsymbol{\sigma = \sqrt{\frac{nX(N-X)}{N^2}}\sqrt{\frac{N-n}{N-1}}}$
- $\boldsymbol{f(x) = \frac{1}{b-a}}$, $\boldsymbol{a < x < b}$, $\boldsymbol{\mu = \frac{a+b}{2}}$ & $\boldsymbol{\sigma = \sqrt{\frac{(b-a)^2}{12}}}$
- $\boldsymbol{f(x) = \lambda e^{-\lambda x}}$, $\boldsymbol{x > 0}$, $\boldsymbol{\mu = \sigma = \frac{1}{\lambda}}$
- $\boldsymbol{f(x) = \frac{1}{\sqrt{2\pi\sigma^2}}\, e^{-\frac{(x-\mu)^2}{2\sigma^2}}}$, $\boldsymbol{-\infty < x < +\infty}$ & $\boldsymbol{-\infty < \mu < +\infty}$ & $\boldsymbol{\sigma > 0}$