KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS

STAT 213: Statistical Methods for Actuaries

Semester 181
Major Exam Two
Wednesday, November 7, 2018
Allowed time 90 minutes

Name: Student ID#: Serial #:

Directions:

1) You must **show all your work** to obtain full credit.
2) Round your answers **to at least 4 decimal places**.
3) You are allowed to use electronic calculators and other reasonable writing accessories that help write the exam.
4) Do not keep your mobile with you during the exam, turn off your mobile and leave it aside.

Question No	Full Marks	Marks Obtained
Q1	*2+3*	
Q2	*4*	
Q3	*4*	
Q4	*4*	
Q5	*5*	
Q6	*3*	
Q7	*4*	
Q8	*5*	
Q9	*5*	
Q10	*2+4*	
Q11	*3+2*	
Q12	*5*	
Total	***55***	

1. The following table presents the probability distribution function for the number of claims processed per hour at an insurance agency.

# of claims	2	3	4	5	6	7	
$P(x)$	0.11	0.16	0.27	0.23	0.13	0.10	

a. What is the average number of claims processed?

b. What is the variance of the number of claims processed?

2. A recent survey showed that 5 percent of the computer keyboards produced by a particular company are defective. What is the probability that out of eight keyboards selected at random, exactly two keyboards will be defective?

3. In a box of 16 chocolates, there are four chocolates with coconut filling. What is the probability of choosing four chocolates, none of which have coconut fillings?

4. On average, an RV sales lot sells 6 RVs per month. Assume the number of sales of RVs per month follows the Poisson distribution. What is the probability that exactly 6 RVs are sold next month?

5. Suppose that 19% of all sales are for amounts greater than $1,000. In a random sample of 30 invoices, what is the probability that more than 10 of the invoices are for over $1,000?

6. The distribution of annual incomes of a sample of college graduates is normally distributed with a mean of $52,000 and a standard deviation of 1,000. About 68 percent of the incomes lie between what two income levels?

7. The median score for the final exam in a chemistry class was 75 and 18% of the students received a grade greater than 80. If the test scores were normally distributed, what is the probability that a randomly selected exam had a score between 75 and 80?

8. During a professor's office hours, students arrive, on average, every ten minutes. Assume that the distribution of the time between arrivals follows an exponential distribution. Suppose that a student has just left. What is the probability that the professor has more than 20 minutes before the next student shows up?

9. In a recent survey of college professors, it was found that the average amount of money spent on entertainment each week was normally distributed with a mean of $95.25 and a standard deviation of $27.32. What is the probability that the average spending of a sample of 25 randomly-selected professors will exceed $102.50?

10. Suppose that 20% of all invoices are for amounts greater than $800. A random sample of 50 invoices is taken.
    a. What is the mean and standard error of the sample proportion of invoices with amounts in excess of $800?

    b. What is the probability that more than 22.7% of these 50 invoices are for more than $800?

11. The number of beverage cans produced each hour from a vending machine is normally distributed with a standard deviation of 8.6. For a random sample of 12 hours, the average number of beverage cans produced was 326.0. Assume a 99% confidence interval for the population mean number of beverage cans produced per hour.
    a. Calculate the margin of error of the 99% confidence interval.

    b. Calculate the width of the 99% confidence interval estimate.

12. In a survey of 472 personnel directors, 63% thought that they would be hiring new personnel over the next three months. Calculate a 98% confidence interval for the proportion of all personnel directors planning to hire personnel over the next three months?