Exam 4 STAT4372

ATTENTION: You have 75 minutes to finish this exam. You can use only our text while working on the exam. Then e-mail me efrom@utdallas.edu your answers - A,A,B,...- on Tuesday, May 5.

Name...............................

Please circle your answer or write to the right a correct answer

Problem 1.	A	B	C	D	E
Problem 2.	A	B	C	D	E
Problem 3.	A	B	C	D	E
Problem 4.	A	B	C	D	E
Problem 5.	A	B	C	D	E
Problem 6.	A	B	C	D	E
Problem 7.	A	B	C	D	E
Problem 8.	A	B	C	D	E
Problem 9.	A	B	C	D	E
Problem 10.	A	B	C	D	E

Problems:

Problem 1. The observations 1.7, 1.6, 1.6 and 1.9 are taken from a random sample. You wish to test the goodness of fit of a distribution with probability density function $f(x) = (x/2)I(0 \leq x \leq 2)$. The critical values of the Kolmogorov-Smirnov statistic are $c_{.1} = 1.11/n^{1/2}$ and $c_{.01} = 1.63/n^{1/2}$. Which of the following you should do:

Answers: (A) Accept at both levels; (B) Accept at .001 level and reject at .1 ; (C)Accept at .1 and reject at .001; (D) Reject at both levels ; (E) Cannot be determined.

Problem 2. A sample of claims is: 29, 64, 90, 135, 182. Claim sizes are assumed to follow an exponential distribution. The mean of the exponential distribution is estimated using method of moments. Calculate the value of the Kolmogorov-Smirnov statistics.

Answers: (A) .14; (B) .16; (C).19; (D) .25; (E) .27.

Problem 3. Calculate the Pearson chi-squared goodness of fit statistic to test the hypothesis that the underlying distribution is Pareto with parameters $\alpha = 1$, $\theta = 2$ given the following grouped observations. 120 observations from [0,2), 70 from [2,6), 15 from [6,10), 15 from [10,14), 30 observations that at least 14. The statistic belongs to the interval:

Answers: (A) [0,3); (B) [3,5); (C) [5,7); (D) [7,9); (E) [9,∞).

Problem 4. You fit a Pareto distribution to a sample of 200 claim amounts and use the likelihood ratio test to test the hypothesis that $\alpha = 1.5$ and $\theta = 7.8$. You are given: The maximum likelihood estimates are $\hat{\alpha} = 1.4$ and $\hat{\theta} = 7.6$. The natural logarithm of the likelihood function evaluated at the maximum likelihood estimates is -817.92. Further, $\sum \ln(x_i + 7.8) = 607.64$. Find the test statistic (the value of chi-squared random variable) and its degrees of freedom.

Answers: (A) (6.5,1); (B) (7.7,2); (C) (7.7,1); (D) (8.1,1); (E) (8.1,2).

Problem 5. The average claim size for a group of insureds is 1500 with standard deviation 7500. Assuming a Poisson claim count distribution, calculate the expected number of claims so that the total loss will be within 6% of the expected total loss with probability .9. This number belongs to the interval:

Answers: (A) [0,10000); (B) [10000,15000); (C) [15000,20000); (D)[2000,25000); (E) [25000,∞).

Problem 6. Given: X is a random variable with mean M and variance V. M is a random variable with mean 2 and variance 4. V is a random variable with mean 8 and variance 32. The Bühlmann credibility factor Z after 3 observations of X belongs to the interval:

Answers: (A) [0,.25); (B) [.25,.5); (C)[.5, .75); (D) [.75,.9); (E) [.9,1].

Problem 7. Which of the following will *decrease* the Bühlmann credibility of the current observations? 1. Decrease in the number of observations. 2. Decrease in the variance of the hypothetical means. 3. Decrease in the expected value of the process variance.

Answers: (A) 1; (B) 2; (C) 3; (D) 1 and 2; (E).1 and 3.

Problem 8. Given a first observation with a value of 2, the Bühlmann credibility estimate for the expected value of the second observation would be 1. Given a first observation with a value of 5, the Bühlmann credibility estimate for the expected value of the second observation would be 2. Determine the Bühlmann credibility of the first observation.

Answers: (A) 1/3; (B) 2/5; (C) 1/2; (D) 3/5; (E) 2/3.

Problem 9. The probability density is $f_X(x) = (1/9)x^2 I(0 \leq x \leq 3)$. You simulate 3 observations from this distribution using the inversion method and the following 3 realizations of the uniform distribution: .008, .729, .125. Then estimate $E(X)$ using these 3 simulated observations.

Answers: (A) 1.6; (B) 2.0; (C) 2.3; (D) 2.6; (E) 3.0.

Problem 10. To estimate $E(X)$ you have simulated $X_1, \ldots, X_5$ with values 1,2,3,4,5. You want the standard deviation of the estimator of $E(X)$ to be less .05. Estimate the total number of simulations needed. It belongs to the interval:

Answers: (A) $[0, 150)$; (B) $[150, 400)$; (C) $[400, 650)$; (D) $[650, 900)$; (E) $[900, \infty)$.