

可使用非程式型(不具備存功能)計算機

1. (20 pts.) Let the k^{th} standardized moment of X be $E\{(X - \mu)/\sigma\}^k$, where $\mu = E(X)$ and σ is the standard deviation of X .
 - (a) Explain in word the meaning of the first four standardized moments (That is $k = 1, 2, 3, 4$)
 - (b) What are the first four standardized moments for a normal random variable.

2. (10 pts.) It is claimed that the failure rate of some printed circuit is less than 0.03. A new design has been implemented. A sample of size 100 circuits from the new design are inspected and there are 2 defective. Does this evidence support the claim? Give your approach to analyze the problem?

3. (20 pts.) You are asked to fit a distribution to a set of data of size 10 as follows. -2.5, -0.8, 0.3, 0.5, 1.2, 2.4, 2.0, 1.8, 1.6, 2.9.
Which of the following distribution(s) is (are) appropriate to fit the data and which is (are) not. Why and why not.
 - (a) Uniform (0, 2)
 - (b) Uniform (-2.5, 3)
 - (c) Normal (0, 1)
 - (d) Exponential (1)
 - (e) Gamma (2, 3)
 - (f) beta (2,3)
 - (g) Weibull (2,3)
 - (h) Chi-squared (9)
 - (i) t-distribution (9)
 - (j) Poisson ($\lambda = 1$)

(note: $X \sim \text{Uniform}(a, b)$ if $f_X(x) = \begin{cases} \frac{1}{b-a}, & \text{if } a \leq x \leq b \\ 0 & \text{otherwise} \end{cases}$)

4. (10 pts.) A manufacturer of electronic calculators offers a one-year warranty. If the calculator fails for any reason during this period, it is replaced. The time to failure is well modeled by the following probability distribution:

$$f(x) = 0.125e^{-0.125x} \quad x > 0$$

What percentage of the calculators will fail within the warranty period?

5. (10 pts.) A lot of size $N=30$ contains five nonconforming units. What is the probability that a sample of five units selected at random contains exactly one nonconforming unit? What is the probability that it contains one or more nonconforming units?
6. (15 pts.) Two different types of glass bottles are suitable for use by a soft drink beverage bottler. The internal pressure strength of the bottle is an important quality characteristic. It is known that $\sigma_1 = \sigma_2 = 30$ psi. From a random sample of $n_1 = n_2 = 16$ bottles, the mean pressure strengths are observed to be $\bar{x}_1 = 175.8$ psi and $\bar{x}_2 = 181.3$ psi. The company will not use bottle design 2 unless its pressure strength exceeds that of bottle design 1 by at least 5 psi. Based on the sample data, should they use bottle design 2?
7. (15 pts.) It is generally believed that taller persons make better basketball players because they are better able to put the ball into the basket. The following table lists the height of a sample of 25 nonbasketball athletes and the number of successful baskets made in a 60-second time period.
- (a) Perform a regression relating GOALS to HEIGHT to ascertain if there is such a relationship and, if there is, estimate the nature of that relationship.
- (b) Estimate the number of goals to be made by an athlete who is 60 inches tall.

九十學年度

工業工程與工程管理系(所)

工業工程

(甲)

(乙)

(丙)

組碩士班研究生招生考試

科目

統計學

科號

2201
2302
2401

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請在試卷【答案卷】內作答

Observation	HEIGHT	GOALS
1	71	15
2	74	19
3	70	11
4	71	15
5	69	12
6	73	17
7	72	15
8	75	19
9	72	16
10	74	18
11	71	13
12	72	15
13	73	17
14	72	16
15	71	15
16	75	20
17	71	15
18	75	19
19	78	22
20	79	23
21	72	16
22	75	20
23	76	21
24	74	19
25	70	13