逢甲大學100學年度碩士班招生考試試題 編號：024 科目代碼：314

科目	統計學(含數理統計學)	適用系所	統計學系統計與精算碩士班應用統計暨計量財務組、精算組	時間	100分鐘

※請務必在答案卷作答區內作答。

1. (15%)Suppose that we have a sample space $S = \{E_1, E_2, E_3, E_4, E_5, E_6, E_7\}$, where $E_1, E_2, \ldots, E_7$ denote the sample points. The following probability assignments apply: $P(E_1) = 0.05$, $P(E_2) = 0.20$, $P(E_3) = 0.20$, $P(E_4) = 0.25$, $P(E_5) = 0.15$, $P(E_6) = 0.10$, and $P(E_7) = 0.05$. Let $z_{0.025} = 1.96$, and

$A = \{E_1, E_4, E_6\}$
$B = \{E_2, E_4, E_7\}$
$C = \{E_2, E_3, E_5, E_7\}$

   a. (3%)Find $P(A)$, $P(B)$, and $P(C)$.
   b. (3%)Find $A \cup B$ and $P(A \cup B)$.
   c. (3%)Find $A \cap B$ and $P(A \cap B)$.
   d. (3%)Are events A and C mutually exclusive?
   e. (3%)Find B^c and $P(B^c)$.

2. (12%)Annual starting salaries for college graduates with degrees in business administration are generally expected to be between $30,000 and $45,000. Assume that a 95% confidence interval estimate of the population mean annual starting salary is desired. What is the planning value for the population standard deviation? How large a sample should be taken if the desired margin of error is
   a. (4%)$500?
   b. (4%)$200?
   c. (4%)$100?

3. (12%)Consider the following data for two independent random samples taken from two normal populations. ($t_{9,0.05} = 1.833$)

Sample 1	10	7	13	7	9	8
Sample 2	8	7	8	4	6	9

   a. (3%)Compute the two sample means.
   b. (3%)Compute the two sample standard deviations.
   c. (3%)What is the point estimate of the difference between the two population means?
   d. (3%)What is the 90% confidence interval estimate of the difference between the two population means?

4. (11%)A study of the educational levels of residents and their satisfaction with public security yielded the following results.

	Satisfaction With Public Security		
Educational Level	**Satisfied**	**Okay**	**Not Satisfied**
Did not complete high school	6	86	48
High school degree	13	126	56
College degree	24	255	110

   Use α= .01 and test to determine whether satisfaction with public security is independent of the educational level of the residents.
   ($\chi^2_{4,0.01} = 7.78$)

5. (10%) Let X be an RV with PDF $f(x) = e^{-x}$ if $x \geqq 0$, and = 0 otherwise. Let Y = sinX. Find the PDF of Y.

6. (30%) Let (X, Y) be jointly distributed with PDF $f(x, y) = 2$, $0 < x < y < 1$, and = 0 otherwise.
   (a) (5%) Find $P(T > 1/3 \mid X = 1/4)$.
   (b) (15%) Find $E(Y \mid x)$, $Var(X \mid y)$, $Cov(X, Y)$.
   (c) (10%) Find the PDF of X + Y.

7. (10%) Let $(X_1, X_2, \ldots, X_n)$ be an RV such that the correlation coefficient between each pair X_i, X_j, $i \neq j$, is ρ. Show that $-(n-1)^{-1} \leqq \rho \leqq 1$.