

系所組別: 自然災害減災及管理國際碩士學位學程

考試科目: 統計學

考試日期: 0222, 節次: 3

※ 考生請注意: 本試題不可使用計算機。請於答案卷(卡)作答, 於本試題紙上作答者, 不予計分。

1. [15 pts] Please give a brief introduction to *central limit theorem*.
2. [10 pts] Please give a brief introduction to *conditional distribution*.
3. [25 pts] Let Y be exponentially distributed with scalar parameter α . The density function of Y is given by $f(y) = 0$ for $y \leq 0$ and $f(y) = \frac{1}{\alpha} e^{-y/\alpha}$ for $y > 0$. Determine the variance and standard deviation of the exponential distribution.
 $(EY = \int_0^{\infty} y \frac{1}{\alpha} e^{-y/\alpha} dy, E(Y^2) = \int_0^{\infty} y^2 \frac{1}{\alpha} e^{-y/\alpha} dy, \text{var}(Y) = E(Y^2) - (EY)^2, \text{hint: using integration by parts})$
4. [25 pts] Determine the probability that 7 or 11 shows at least twice when two fair dice are rolled together four times in an honest manner. (Please list the calculation. You do not need to obtain the final numerical answer)
(The probability function of the binomial distribution with parameters n and π is given by $f(y) = \binom{n}{y} \pi^y (1-\pi)^{n-y}$)
5. Suppose that the average number of telephone calls arriving at the switchboard of a small corporation is 30 calls per hour. (a) [10 pts] What is the probability that no calls will arrive in a 3-minute period? (b) [15 pts] What is the probability that more than five calls will arrive in a 5-minute interval? (Assume that the number of calls arriving during any time period has a Poisson distribution: $\frac{(\lambda\pi)^y}{y!} e^{-\lambda\pi}$) (Please list the calculation. You do not need to obtain the final numerical answer)