

東吳大學 105 學年度轉學生(含進修學士班轉學生)招生考試試題

第 1 頁，共 2 頁

系級	財務工程與精算數學系三年級	考試時間	100 分鐘
科目	機率與統計	本科總分	100 分

1. (20%) 若 $P(A') = 0.4$, $P(B' | A) = 0.3$, $P(B | A') = 0.4$ 。試求：
 (a) $P(A' \cap B)$ (b) $P(A \cup B)$ (c) $P(A' | B)$ (d) $P(A' | B')$
2. (10%) 若隨機變數 X 之機率分配為 $U(a, b)$, 且 $E(X) = 1$, $Var(X) = \frac{4}{3}$, 試求 $P(X > 0)$ 。
3. Suppose X has the geometric distribution; that is, the pmf of X is

$$f(x) = q^{x-1}p, \quad x = 1, 2, 3, \dots$$
 (a) (5%) Find the mgf of X .
 (b) (5%) Find $E(X)$.
 (c) (5%) Find $Var(X)$.
4. (10%) If the moment-generating function of X is $M(t) = e^{166t+200t^2}$, find $P(170 < X < 200)$.
 【註: 機率值查表參考資料在考卷的最後一頁】
5. (15%) Let the joint pmf of X and Y be

$$f(x, y) = \frac{1}{3}, \quad (x, y) \in S = \{(0, 1), (1, 0), (2, 1)\}.$$
 (a) Are X and Y independent?
 (b) Calculate $Cov(X, Y)$ and ρ .
 (c) 由(a)(b)之結果說明“ $Cov(X, Y) = 0$ (or $\rho = 0$) $\Rightarrow X$ and Y are independent”之敘述是否為真?
6. (10%) Let X have the pdf $f(x) = xe^{-x^2/2}$, $0 < x < \infty$. Find the pdf of $Y = X^2$.
7. (10%) Let \bar{X} be the mean of a random sample of size 36 from an exponential distribution with mean 3. Approximate $P(2.5 \leq \bar{X} \leq 4)$.
 【註: 中央極限定理的應用，機率值查表參考資料在考卷的最後一頁】

背面尚有試題

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第 2 頁，共 2 頁

系級	財務工程與精算數學系三年級	考試時間	100 分鐘
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8. Suppose that the length of life in hours, say X , of a light bulb manufactured by company A is $N(850, 14400)$ and the length of life in hours, say Y , of a light bulb manufactured by company B is $N(800, 2500)$. One bulb is selected from each company and is burned until "death".
- (a) (5%) Find the probability that the length of life of the bulb from company A exceeds the length of life of the bulb from company B by at least 24 hours?
- (b) (5%) Find the probability that at least one of the bulbs "lives" for at least 910 hours.
- 【註：機率值查表參考資料在考卷的最後一頁】

參考資料

The Normal Distribution: $\Phi(z) = P(Z \leq z) = \int_{-\infty}^z \frac{1}{\sqrt{2\pi}} e^{-\frac{w^2}{2}} dw$

$\Phi(0.2) = 0.5793$	$\Phi(0.5) = 0.6915$	$\Phi(1.0) = 0.8413$	$\Phi(1.5) = 0.9332$
$\Phi(1.7) = 0.9554$	$\Phi(2.0) = 0.9772$	$\Phi(2.2) = 0.9861$	$\Phi(2.5) = 0.9938$