

# 銘傳大學九十學年度轉學生招生考試

## 應統 轉三

七月三十日 第三節

### 應用統計學 試題

\*可以使用計算機

1. 令  $m(t) = \frac{1}{10}e^t + \frac{2}{10}e^{2t} + \frac{3}{10}e^{3t} + \frac{4}{10}e^{4t}$ ，是隨機變數  $Y$  的動差母函數(moment-generating function)。

- 求  $Y$  的平均數  $E(Y)$  及變異數  $Var(Y)$ ? (10%)
- 令  $Z = 2Y+1$ ，求  $Z$  的分配及  $Z$  的動差母函數? (10%)

2. 某電腦工廠的生產線，因為機器的螺絲鬆動造成該生產線有 10% 的不良率，該期間共隨機賣出 10 部電腦，令  $Y$  表示賣出的電腦個數。

- 求  $Y$  的平均數  $E(Y)$  及變異數  $Var(Y)$ ? (10%)
- 假設回收壞電腦所需要的修復成本為  $C=3Y^2+Y+2$ ，求該段期間的平均修復成本  $E(C)=?$  (10%)

3. 某考試的時間必須在一個小時內完成，假設學生交卷的時間  $Y$  是一個隨機變數，其機率密度函數(probability density function)如下：

$$f(y) = \begin{cases} cy^2 + y, & 0 \leq y \leq 1 \\ 0, & elsewhere. \end{cases}$$

- 求  $c=?$  (10%)
- 隨機選出一學生，該生在半小時之內交卷的機率是多少? (10%)

4.

a. 某食品工廠所生產的產品標準重量  $Y$  唯一隨機變數，其分配為常態分配，平均數  $\mu$  公斤，標準差(standard deviation) 0.3 公斤，假如該產品超過 8.688 公斤的機率為 2.5%，求  $\mu=?$

b. 承上題，假設該產品的標準規格為  $8 \pm 0.5$  公斤，若不符合規格將重新包裝，請問隨機抽出一個產品，該產品重新包裝的機率有多大? (10%)

5.

a. 請敘述中央極限定理(Central Limit Theorem)(10%)

b. 某廠牌電燈泡的壽命  $Y$  (單位：小時) 的分配，服從一指數分配，其機率密度函數為

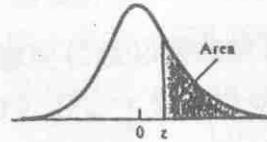
$$f(y) = \begin{cases} \frac{1}{1000} e^{-\frac{y}{1000}}, & 0 \leq y \\ 0, & elsewhere. \end{cases}$$

隨機抽出該廠牌電燈泡 100 個，利用中央極限定理，求該 100 個電燈泡的平均壽命  $\bar{y}$  大於

1100 小時的機率有多大？(10%)

\*可使用計算機

**Table 4**  
Normal curve areas  
Standard normal probability in right-hand tail (for negative values of  $z$  areas are found by symmetry)



z	Second decimal place of z									
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0722	.0708	.0694	.0681
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1.8	.0359	.0352	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
2.9	.0019	.0018	.0017	.0017	.0016	.0016	.0015	.0015	.0014	.0014
3.0	.00135									
3.5	.000233									
4.0	.0000317									
4.5	.00000340									
5.0	.000000287									

From R. E. Walpole, *Introduction to Statistics* (New York: Macmillan, 1968).

〈試題完〉