

一、單選題 (每一題 4 分，合計 40 分)

1. Which one of these is not used in the five-number summary?
(A) minimum
(B) Q_1
(C) mean
(D) median
(E) none of the above
2. Suppose for 15 independent Bernoulli trials with probability of success of .99, what is the probability all are successes?
(A) 0.86
(B) 0.01
(C) 0.14
(D) 0.99
(E) none of the above
3. In a certain lottery, the cost of a ticket is \$5. There is a 1 out of 100 chance of winning \$100 and a 1 in 20,000 chance of winning \$100,000. If you purchase 1 ticket, what is your expected gain?
(A) \$33,365
(B) \$6
(C) \$1.05
(D) \$2.05
(E) none of the above
4. A two-sided p-value for a hypothesis test is _____ a one sided p-value
(A) half as big as
(B) twice as big as
(C) the same as
(D) always smaller than
(E) none of the above
5. Which of the following is not a law of probability?
(A) law of complement
(B) addition law
(C) empirical law
(D) multiplication law
(E) none of the above
6. For a continuous random variable X with mean μ what is the $P(X = \mu)$?
(A) 1
(B) 0.5
(C) 0
(D) μ
(E) none of the above
7. The standard deviation of the mean will never be greater than
(A) the sample mean.
(B) the population mean.
(C) the population variance.
(D) the population standard deviation.
(E) none of the above.

8. The randomized block experiment is based on the partition of the total sum of squares into _____ components.
- (A) 1
(B) 2
(C) 3
(D) 4
(E) none of the above
9. Which of the following is an assumption for the small sample matched pair comparison?
- (A) $X_1, X_2, \dots, X_{n_1}$ and $Y_1, Y_2, \dots, Y_{n_2}$ are independent.
(B) The differences, $D_i = X_i - Y_i$ are normally distributed.
(C) $X_1, X_2, \dots, X_{n_1}$ and $Y_1, Y_2, \dots, Y_{n_2}$ have the same variance.
(D) n_1 and n_2 are each at least 15.
(E) none of the above
10. Which of the following is true if A and B are independent?
- (A) $P(B | A) = P(A)$
(B) $P(A \cup B) = P(A) + P(B)$
(C) $P(A \cap B) = P(A)P(B | A)$
(D) All of these imply A and B are independent.
(E) none of the above

二、計算題 (每一大題共有兩小題，每一小題各 5 分，合計 60 分)

1. 某工廠欲瞭解早班、午班與晚班輪值人員所生產之特定產品的不良比率是否相同，分別由三個時段中隨機各抽得 100 個產品檢驗之，得到如下資料：

時段	早班	午班	晚班
不良個數	10	5	12

試問在顯著水準 0.05 下，此資料是否足以顯示該產品在三個時段之不良比率不盡相同？

- (1) 請說明您所使用之統計檢定方法的名稱為何？
(2) 又請列出完整的檢定過程與最後檢定結果。
2. 大發賣場進貨一批某知名品牌 47 吋液晶電視共 10 台，已知其中的 7 台係出自甲生產線，3 台則出自乙生產線。現吳先生去購買時，賣場已售出該款液晶電視 2 台，因此將由剩餘的 8 台中選購一台，試問：
- (1) 吳先生所選購的液晶電視係出自甲生產線的機率為何？
(2) 若已知吳先生選購的液晶電視出自甲生產線，則已售出的 2 台是出自乙生產線的機率又為何？
3. 設雪山農場生產的橘子之重量滿足一常態分配，已知平均重量為 100 公克，且亦已知該農場橘子的重量大於 150 公克的機率為 0.0228，則
- (1) 若該農場為販賣方便，將橘子 10 個裝成一箱，則其所生產一箱橘子的平均重量及標準差分別為若干？
(2) 若自該農場隨機抽取 25 個橘子，則此 25 個橘子之平均重量大於 108 公克的機率為何？

4. 某醫學研究人員欲瞭解不同藥劑服用量(X)與舒解偏頭痛時間長度(Y)的關係；因此，針對 10 位自願參與臨床實驗的病患給予不同藥劑服用量，並記錄服用後能舒解偏頭痛的實際時間長度；同時推估如下的線性迴歸模式：

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$$

式中 ε_i 為獨立隨機誤差項且滿足平均數為 0，標準差為 σ 的常態分配。

經由以普通最小平方方法(OLS)估計該模式為 $\hat{Y}_i = -1.07 + 2.74X_i$ ，且求得 $\sum_{i=1}^{10} (X_i - \bar{X})^2 = 40.9$

和 $\sum_{i=1}^{10} (Y_i + 1.07 - 2.74X_i)^2 = 63.6528$ 。則根據這些資訊，

- (1) 請估計誤差項的母體標準差 σ 值。
 - (2) 請求得斜率 β_1 的 95% 的信賴區間。
5. 某大學欲瞭解新開的一門共同科目開放給大二、三、四同學選讀的平均學習成效是否相同，而由選讀完畢的三個年級同學中各隨機抽出 5 人，整理其學習成績如下：

年級別	大二	大三	大四
平均成績	82	78	77
標準差	9	8	10

- (1) 若欲檢定三個年級的平均成績是否相同，則該分析模式的假設條件為何？
 - (2) 請在顯著水準 0.05 下，檢定三個年級的平均成績是否相等（請務必列出檢定過程）。
6. 設隨機變數 X 的機率分配如下：

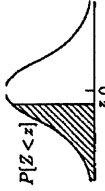
$$f(x) = k(x^2 + 1), \quad x = -1, 0, 1, 2$$

式中 k 為常數，試求下列各值：

- (1) $P(X > 0) = ?$
- (2) 若隨機變數 $Y = 2X - 1$ ，則 Y 的期望值與變異數各為何？

100 學年度研究所碩士班考試入學
應用經濟與管理學系經營管理碩士班
統計學考科

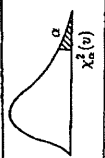
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z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0007	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0010	.0010	.0010
-2.9	.0019	.0018	.0018	.0018	.0017	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0022	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
- .9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
- .8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
- .7	.2420	.2389	.2358	.2327	.2297	.2266	.2236	.2206	.2177	.2148
- .6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
- .5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
- .4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
- .3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
- .2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
- .1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
- .0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

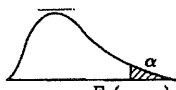


α	.01	.025	.05	.10	.25
1	31.821	12.706	6.314	3.078	1.000
2	6.965	4.303	2.920	1.886	.816
3	4.541	3.182	2.353	1.638	.765
4	3.747	2.776	2.132	1.533	.741
5	3.365	2.571	2.015	1.476	.727
6	3.143	2.447	1.943	1.440	.718
7	2.998	2.365	1.895	1.415	.711
8	2.896	2.306	1.860	1.397	.706
9	2.821	2.262	1.833	1.383	.703
10	2.764	2.228	1.812	1.372	.700
11	2.718	2.201	1.796	1.363	.697
12	2.681	2.179	1.782	1.356	.695
13	2.650	2.160	1.771	1.350	.694
14	2.624	2.145	1.761	1.345	.692
15	2.602	2.131	1.753	1.341	.691
16	2.583	2.120	1.746	1.337	.690
17	2.567	2.110	1.740	1.333	.689
18	2.552	2.101	1.734	1.330	.688
19	2.539	2.093	1.729	1.328	.688
20	2.528	2.086	1.725	1.325	.687
21	2.518	2.080	1.721	1.323	.686
22	2.508	2.074	1.717	1.321	.686
23	2.500	2.069	1.714	1.319	.685
24	2.492	2.064	1.711	1.318	.685



α	.99	.975	.95	.90	.50	.10	.05	.025	.01
1	0.0002	.001	.004	.02	.45	2.71	3.84	5.02	16.01
2	.02	.05	.10	.21	1.39	4.61	5.99	7.38	18.51
3	.11	.22	.35	.58	2.37	6.25	7.81	9.35	21.59
4	.30	.48	.71	1.06	3.36	7.78	9.49	11.14	24.49
5	.55	.83	1.15	1.61	4.35	9.24	11.07	12.83	27.49
6	.87	1.24	1.64	2.20	5.35	10.64	12.59	14.45	30.58
7	1.24	1.69	2.17	2.83	6.35	12.02	14.07	16.01	33.80
8	1.65	2.18	2.73	3.49	7.34	13.36	15.51	17.53	37.16
9	2.09	2.70	3.33	4.17	8.34	14.68	16.92	19.02	40.78

$\alpha = .05$



$v_2 \backslash v_1$	1	2	3	4	5	6	7	8	9	10	12	15	20	25	30
1	161.5	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9	243.9	246.0	248.0	249.3	250.1
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.46	19.46
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.63	8.62
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.52	4.50
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.83	3.81
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.40	3.38
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.11	3.08
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.89	2.86
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.73	2.70
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.60	2.57
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.50	2.47
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.41	2.38
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.34	2.31
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.28	2.25