單選題，每小題 5 分，共 100 分

Exhibit-A. Assume that A and B are events with $P(A) = 0.5$ and $P(A \cap B) = 0.2$. Then

1. Refer to Exhibit-A. Let A^c denote the complement of event A. Then $P(A^c) =$

(A)	0.2	(B)	0.3	(C)	0.4	(D)	0.5

2. Refer to Exhibit-A. Let B^c denote the complement of event. Then $P(A \cap B^c) =$

(A)	0.1	(B)	0.2	(C)	0.3	(D)	0.4

3. Refer to Exhibit-A. Let $A - B$ denote the difference of A and B. Then $P(A - B) =$

(A)	0.2	(B)	0.3	(C)	0.4	(D)	0.5

4. Refer to Exhibit-A. $P(B \mid A) =$

(A)	0.4	(B)	0.5	(C)	0.6	(D)	0.7

Exhibit-B. In hypothesis testing H_0 against H_1,

5. Refer to Exhibit-B. The sum of the values of the probabilities of Type I error and Type II error is

(A) always add up to 1.0	(B) always add up to 0.5
(C) always add up to 0.05	(D) None of these alternatives is correct.

6. Refer to Exhibit-B. What type of error occurs if you fail to reject H_0 when, in fact, it is not true?

(A) Type II
(B) Type I
(C) either Type I or Type II, depending on the level of significance
(D) either Type I or Type II, depending on whether the test is one tail or two tail

7. Refer to Exhibit-B. The probability of committing a Type I error when the null hypothesis is true is

(A) the confidence level	(B) greater than 1
(C) the level of significance	(D) None of these alternatives is correct.

8. Refer to Exhibit-B. Then

(A) the smaller the Type I error, the smaller the Type II error will be
(B) the smaller the Type I error, the larger the Type II error will be
(C) Type II error will not be effected by Type I error
(D) the sum of Type I and Ttype II errors must equal to 1

Exhibit-C. In an one-tailed hypothesis test $H_0 : \mu = 60$ against $H_1 : \mu < 60$,

9. Refer to Exhibit-C. The test statistic is determined to be $Z = -1.8$. The p-value for this test is

(A)	0.0359	(B)	0.4641	(C)	0.5359	(D)	0.9641

10. Refer to Exhibit-C. Given a 5% significance level, the critical value is

(A) -2	(B) -1.96
(C) -1.645	(D) None of these alternatives is correct.

11. Refer to Exhibit-C. Given the test statistic is $Z = -1.8$ and a 5% significance level, then the power of this test is

(A) 0.025	(B) 0.05
(C) 0.10	(D) Inconclusive.

12. Refer to Exhibit-C. Given a 5% significance level, state the conclusion.

(A) Because $Z > -2$, H_0 cannot be rejected.	(B) Because $Z < -1.645$, we do reject H_0.
(C) Because $Z < -1.96$, H_0 cannot be rejected.	(D) Inconclusive.

Exhibit-D. Assume that X is a normally distributed random variable with a mean μ and the standard deviation σ. That is, $X \sim N(\mu, \sigma^2)$. Let $P(X < 60) = 0.023$ and $P(X \leq 75) = 0.84$

13. Refer to Exhibit-D. The mean μ of X is approximately to be

(A)	65	(B)	70	(C)	75	(D)	80

14. Refer to Exhibit-D. The standard deviation σ of X is approximately to be

(A)	5	(B)	6	(C)	7	(D)	8

15. Refer to Exhibit-D. The probability $P(65 \leq X \leq 75)$ is approximately to be

(A)	0.32	(B)	0.34	(C)	0.6	(D)	0.68

16. Refer to Exhibit-D. The probability $P(X \geq 65)$ is approximately to be

(A)	0.5	(B)	0.66	(C)	0.84	(D)	0.954

Exhibit-E. When individuals in a sample of 150 were asked whether or not they supported capital punishment, the following information was obtained. We are interested in determining whether or not the opinions of the individuals (as to Yes, No, and No Opinion) are uniformly distributed.

Do you support capital punishment	Yes	No	No opinion
Number of individuals	120	80	100

17. Refer to Exhibit-E. The expected frequency for each group is

(A)	80	(B)	90	(C)	100	(D)	120

18. Refer to Exhibit-E. The number of degrees of freedom associated with this problem is

(A)	1	(B)	2	(C)	3	(D)	4

19. Refer to Exhibit-E. The test statistic is

(A)	2	(B)	4	(C)	6	(D)	8

20. Refer to Exhibit-E. The conclusion of the test (at 95% confidence) is that

(A) The null hypothesis must be rejected.	(B) The p-value is less than 0.01.
(C) The p-value is larger than 5%.	(D) None of these alternatives is correct.

(表一) 若 $Z \sim N(0,1)$，則標準常態表的累積機率 $P(0 \le Z \le z)$
例如：$P(0 \le Z \le 1.96) = 0.4750$

Z	0	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

(表二) 若 $X \sim t(n)$，則單尾的 t 分配機率
例如：$P(t(4) \ge 2.776) = 0.025$

d.f.	0.01	0.0125	0.025	0.05
1	31.821	25.452	12.706	6.314
2	6.965	6.205	4.303	2.920
3	4.541	4.177	3.182	2.353
4	3.747	3.495	2.776	2.132
5	3.365	3.163	2.571	2.015
6	3.143	2.969	2.447	1.943
7	2.998	2.841	2.365	1.895
8	2.896	2.752	2.306	1.860
9	2.821	2.685	2.262	1.833
10	2.764	2.634	2.228	1.812
11	2.718	2.593	2.201	1.796
12	2.681	2.560	2.179	1.782
13	2.650	2.533	2.160	1.771
14	2.624	2.510	2.145	1.761
15	2.602	2.490	2.131	1.753
16	2.583	2.473	2.120	1.746
17	2.567	2.458	2.110	1.740
18	2.552	2.445	2.101	1.734
19	2.539	2.433	2.093	1.729
20	2.528	2.423	2.086	1.725
21	2.518	2.414	2.080	1.721
22	2.508	2.405	2.074	1.717
23	2.500	2.398	2.069	1.714
24	2.492	2.391	2.064	1.711
25	2.485	2.385	2.060	1.708
26	2.479	2.379	2.056	1.706
27	2.473	2.373	2.052	1.703
28	2.467	2.368	2.048	1.701
29	2.462	2.364	2.045	1.699
30	2.457	2.360	2.042	1.697

(表三) 若 $X \sim \chi^2(n)$，則卡方分配的機率：$P(\chi^2(15) \ge 24.9958) = 0.05$。

d.f.	0.005	0.01	0.025	0.05	0.10	0.20
1	7.8794	6.6349	5.0239	3.8415	2.7055	1.6424
2	10.5966	9.2103	7.3778	5.9915	4.6052	3.2189
3	12.8382	11.3449	9.3484	7.8147	6.2514	4.6416
4	14.8603	13.2767	11.1433	9.4877	7.7794	5.9886
5	16.7496	15.0863	12.8325	11.0705	9.2364	7.2893
6	18.5476	16.8119	14.4494	12.5916	10.6446	8.5581
7	20.2777	18.4753	16.0128	14.0671	12.0170	9.8032
8	21.9550	20.0902	17.5345	15.5073	13.3616	11.0301
9	23.5894	21.6660	19.0228	16.9190	14.6837	12.2421
10	25.1882	23.2093	20.4832	18.3070	15.9872	13.4420
11	26.7568	24.7250	21.9200	19.6751	17.2750	14.6314
12	28.2995	26.2170	23.3367	21.0261	18.5493	15.8120
13	29.8195	27.6882	24.7356	22.3620	19.8119	16.9848
14	31.3193	29.1412	26.1189	23.6848	21.0641	18.1508
15	32.8013	30.5779	27.4884	24.9958	22.3071	19.3107
16	34.2672	31.9999	28.8454	26.2962	23.5418	20.4651
17	35.7185	33.4087	30.1910	27.5871	24.7690	21.6146
18	37.1565	34.8053	31.5264	28.8693	25.9894	22.7595
19	38.5823	36.1909	32.8523	30.1435	27.2036	23.9004
20	39.9968	37.5662	34.1696	31.4104	28.4120	25.0375
21	41.4011	38.9322	35.4789	32.6706	29.6151	26.1711
22	42.7957	40.2894	36.7807	33.9244	30.8133	27.3015
23	44.1813	41.6384	38.0756	35.1725	32.0069	28.4288
24	45.5585	42.9798	39.3641	36.4150	33.1962	29.5533
25	46.9279	44.3141	40.6465	37.6525	34.3816	30.6752

(表四) 單尾為 0.05 之 $F(m,n)$ 分配，即 $P(F(m,n) \ge f) = 0.05$。
例如：$P(F(6,5) \ge 4.9503) = 0.05$。

	1	2	3	4	5	6	7	8	9	10	11	12
1	161.447	199.500	215.707	224.5832	230.161	233.986	236.768	238.882	240.543	241.881	242.983	243.9060
2	18.5128	19.0000	19.1643	19.2468	19.2964	19.3295	19.3532	19.3710	19.3848	19.3959	19.4050	19.4125
3	10.1280	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452	8.8123	8.7855	8.7633	8.7446
4	7.7086	6.9443	6.5914	6.3882	6.2561	6.1631	6.0942	6.0410	5.9988	5.9644	5.9358	5.9117
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725	4.7351	4.7040	4.6777
6	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2067	4.1468	4.0990	4.0600	4.0274	3.9999
7	5.5914	4.7374	4.3468	4.1203	3.9715	3.8660	3.7870	3.7257	3.6767	3.6365	3.6030	3.5747
8	5.3177	4.4590	4.0662	3.8379	3.6875	3.5806	3.5005	3.4381	3.3881	3.3472	3.3130	3.2839
9	5.1174	4.2565	3.8625	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789	3.1373	3.1025	3.0729
10	4.9646	4.1028	3.7083	3.4780	3.3258	3.2172	3.1355	3.0717	3.0204	2.9782	2.9430	2.9130
11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.9480	2.8962	2.8536	2.8179	2.7876
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964	2.7534	2.7173	2.6866
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144	2.6710	2.6347	2.6037
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458	2.6022	2.5655	2.5342
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876	2.5437	2.5068	2.4753
16	4.4940	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377	2.4935	2.4564	2.4247
17	4.4513	3.5915	3.1968	2.9647	2.8100	2.6987	2.6143	2.5480	2.4943	2.4499	2.4126	2.3807
18	4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563	2.4117	2.3742	2.3421
19	4.3807	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4227	2.3779	2.3402	2.3080
20	4.3512	3.4928	3.0984	2.8661	2.7109	2.5990	2.5140	2.4471	2.3928	2.3479	2.3100	2.2776
21	4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205	2.3660	2.3210	2.2829	2.2504
22	4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419	2.2967	2.2585	2.2258
23	4.2793	3.4221	3.0280	2.7955	2.6400	2.5277	2.4422	2.3748	2.3201	2.2747	2.2364	2.2036
24	4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002	2.2547	2.2163	2.1834
25	4.2417	3.3852	2.9912	2.7587	2.6030	2.4904	2.4047	2.3371	2.2821	2.2365	2.1979	2.1649