



1. Bowl C contains 12 red chips and 8 blue chips. Ten of these 20 chips are selected at random and without replacement and put in bowl D, which was originally empty. Two chips are then drawn at random from bowl D. Given that these two chips are blue, find the conditional probability that 4 red chips and 6 blue chips were transferred from bowl C to bowl D. _____ (10 points)
2. A certain type of aluminum screen that is 2 feet wide has on the average one flaw in a 100-foot roll. Find the probability that a 50-foot roll has no flaws. _____ (10 points)
3. A random sample of size 8 from $N(\mu, 72)$ yielded $\bar{x}=85$. Find the 95% confidence intervals for μ . _____ (10 points)
4. Assume that the weight of cereal in a "10-ounce box" is $N(\mu, \sigma^2)$. To test $H_0: \mu = 10.1$ against $H_1: \mu > 10.1$, we take a random sample of size $n=16$ and observe that $\bar{x} = 10.4$ and $s = 0.4$. What is the approximate p-value of this test? _____ (10 points)
5. In a large bin of crocus bulbs it is claimed that 1/4 will produce yellow crocuses, 1/4 will produce white crocuses, and 1/2 will produce purple crocuses. If 40 bulbs produced 6 yellow, 7 white, and 27 purple crocuses, what is the value of the χ^2 statistics? _____ (10 points)
6. Let the random variables X and Y have the joint p.d.f.

$$f(x, y) = x + y, \quad 0 < x < 1, 0 < y < 1.$$

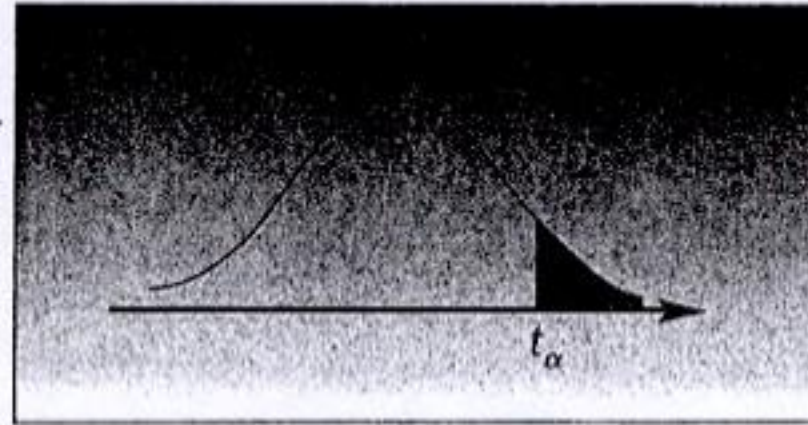
$$= 0 \quad \text{elsewhere.}$$
 - [a] Compute the variance of X. _____ (5 points)
 - [b] Compute the correlation coefficient of X and Y. _____ (5 points)



7. A simple regression produces the regression equation $\hat{Y} = 5X + 7$.
- [a] If we add 2 to all the X values in the data (and keep the Y values the same as the original), what will be the new regression equation be? _____ . (3 points)
- [b] If we add 2 to all the Y values in the data (and keep the X values the same as the original), what will be the new regression equation be? _____ . (3 points)
- [c] If we multiply all the X values in the data by 2 (and keep the Y values the same as the original), what will be the new regression equation be? _____ . (2 points)
- [d] If we multiply all the Y values in the data by 2 (and keep the X values the same as the original), what will be the new regression equation be? _____ . (2 points)
8. Let the random variables X and Y have the joint p.d.f.
- $$f(x, y) = x + y, \quad 0 < x < 1, 0 < y < 1.$$
- $$= 0 \quad \text{elsewhere.}$$
- [a] Compute the variance of X. _____ . (5 points)
- [b] Compute the correlation coefficient of X and Y. _____ . (5 points)
9. A recent study by *What Mortgage?* A British personal finance magazine, found that of 72 lenders, the 25 offering the best value were mutuals. Their rates were, on average, 1% lower than those of nonmutuals. Here the sample size of mutuals, n_1 , is 25, and the sample size of nonmutuals, n_2 is $72 - 25 = 47$. Assume the sample standard deviation of rates offered by mutuals, S_1 , equal to that of rates offered by nonmutuals S_2 , and $S_1 = S_2 = 2\%$.
- [a] Compute the test statistic for testing whether the rates offered by mutuals and nonmutuals, on average, statistically different. _____ . (5 points).
- [b] Should we conclude the difference between the rates offered by mutuals and nonmutuals under a 5% significance level in a two-tailed test? _____ (5 points).



10. Consider the use of metal detectors in airports to test people for concealed weapons. In essence, this is a form of hypothesis testing.
- [a] What is the null hypothesis? _____. (2 point)
 - [b] What is the alternative hypothesis? _____. (1 point)
 - [c] What are type I errors in this case? _____. (2 point)
 - [d] What are type II errors in this case? _____. (1 point)
 - [e] If the sensitivity of the metal detector is increased, how would the probabilities of type I errors be affected? _____. (2 point)
 - [f] If the sensitivity of the metal detector is increased, how would the probabilities of type II errors be affected? _____. (2 point)



Degrees of Freedom	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
∞	1.282	1.645	1.960	2.326	2.576



1. (20%) 隨著網路與資訊軟硬體技術的快速發展，電子化(e 化)已成為無論「製造業」或「服務業」能否具有競爭力或是能否永續經營的關鍵之一，請說明你所服務單位「目前使用」或「預計導入」資訊系統的狀況、成功的應用與發生的困難及原因。

「管理」可視為規劃、執行、分析、與回饋改善的循環，請回答以下問題：

2. (20%) 請說明你所服務的單位如何進行管理之「規劃面」，資訊系統如何能協助你。
3. (20%) 請說明你所服務的單位如何進行管理之「執行面」，資訊系統如何能協助你。
4. (20%) 請說明你所服務的單位如何進行管理之「分析面」，資訊系統如何能協助你。
5. (20%) 請說明雲林科技大學「工業工程與管理研究所」如何能提供你在專業管理能力之提升。