1. The following data are the monthly average price of a particular vegetable per pound and the monthly average price of steak meat per pound sold in the local two supermarkets. (10 pts.)

The average price of vegetable per pound

Month	Jan	Feb	Mar.	Apr.	May	June	July	Aug	Sep	Oct	Nov	Dec
Market A	1.09	1.29	1.19	1.09	.89	.69	.59	.79	.89	.99	1.19	1.19
Market B	1.19	1.29	1.29	1.09	.99	.69	.49	.69	.79	.99	1.09	.99

The average price of steak meat per pound

Month	Jan	Feb	Mar.	Apr.	May	June	July	Aug	Sep	Oct	Nov	Dec
Market A	4.39	4.69	4.29	4.39	4.59	4.19	3.89	4.29	4.69	4.79	4.49	4.39
Market B	4.49	4.79	4.49	4.19	4.29	3.99	3.99	4.19	4.59	4.89	4.69	4.49

Summary statistics

MARKET=A

N Obs	Variable	N	Minimum	Maximum	Mean	Std Dev	CV	Median
12	MEAT	12	3.890	4.790	4.423	0.249	5.6484	4.39
	VEGETABLE	12	0.590	1.290	0.990	0.221	22.3802	1.04

MARKET=B

N Obs	Variable	N	Minimum	Maximum	Mean	Std Dev	CV	Median
12	MEAT	12	3.990	4.890	4.423	0.296	6.7018	4.49
	VEGETABLE	12	0.490	1.290	0.965	0.252	26.1878	0.99

Note : C.V. stands for coefficient of variation

(a) Is the price of vegetable per pound is more stable than that of steak meat per pound for Market A ? (State your reasons according to what you have learned from Statistics class.)

(b) Which supermarket would you prefer to shop ? Why ?

2. A card is chosen at random from a standard deck of 52 cards. (15 pts)

(a) Are the event of getting " Spade" and the event of getting " Red " independent ?

(b) Are the event of getting " Spade" and the event of getting "King " independent ?

3. The owner of Fashion Designs knows that only four customers can be handled effectively in a 15-minute period. If the average number of customers in a 15-minute interval is three, (22 pts)

(a) What probability distribution can be assumed for the number of customers in a 15-minute period ?

(b) What is the probability that more than twelve customers will arrive in a 45-minute interval ?

(c) What is the probability that more than 5 minutes will elapse between successive two customers

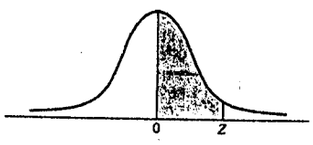
4. A wall is to be built with 30 cement blocks. The length of the cement blocks has mean 20 inch, and standard deviation 0.2 inch. (15 pts)
   (a) What **assumptions** would you make in order to find the mean and standard deviation of the length of the wall ? Find the mean and standard deviation of the length of the wall .
   (b) Find the approximate probability that the length of the wall is within 3 inch of 600 inch ? (Hint: State that which **theorem** you have applied)

5. A manufacturer of light bulbs constructs a 90% confidence interval (5107, 5293) to estimate the mean life time of his products. This manufacturer would like to know the interpretation of confidence coefficient. The following interpretation(meaning) of confidence coefficient which one of the statements are correct ? *Please explain your reasons.* (12 pts)
   (a) There are 90% of light bulbs whose life times are between 5107 and 5293 hours.
   (b) The probability that the mean life time of light bulbs will lies between 5107 and 5293 hours is .9.
   (c) The probability that this C.I. (5107, 5293) will contain the mean life time of light bulbs is .9.
   (d) If you repeatedly obtained random samples and constructed C.I.s, say 100 C.I.s, then 90% of these C.I.s will contain the mean life time of light bulbs.

6. Suppose a student concludes that a difference in two sample means is 'Statistically significant at the 2% level. For the following statements, answer True or False; if False, correct it. (12 pts)
   (a) The P-value for H_0 : $H_0: \mu_1 = \mu_2$ is more than 2%.
   (b) The difference would also be statistically significant at the 5% level.
   (c) If there were no difference in the population means(that is when H_0 is true), the chance of getting such a difference or more in the sample means is 2% or less ?

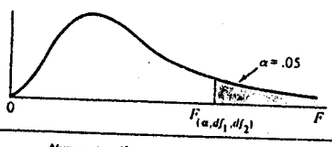
7. One student perform the following testing procedure, please point out the **errors** of his solution, **correct** these errors, and state the **assumptions** to perform such test. (14 pts)
   Let σ_1^2 be the variance of service minutes at *McDonald's*, and
   σ_2^2 be the variance of service minutes at *Wendy*.
   Sample size of each group is 13; $\alpha = 0.05$
   According to the sample, the sample standard deviation of *McDonald's*, computed is $S_1 = 0.124$,
   the sample standard deviation of *Wendy* computed is $S_2 = 0.233$
   Then apply F-test to test $H_0 : \sigma_1 = \sigma_2$ v.s. $H_a : \sigma_1 \neq \sigma_2$
   $$F = \left(\frac{0.124}{0.233}\right)^2 = 0.283$$
   Since $0.283 < F_{0.05}(12,12) = 2.69$, hence conclude $\sigma_1 = \sigma_2$.

The standardized normal distribution

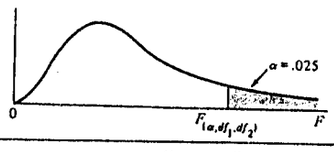


Entry represents area under the standardized normal distribution from the mean to Z

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.49865	.49869	.49874	.49878	.49882	.49886	.49889	.49893	.49897	.49900
3.1	.49903	.49906	.49910	.49913	.49916	.49918	.49921	.49924	.49926	.49929
3.2	.49931	.49934	.49936	.49938	.49940	.49942	.49944	.49946	.49948	.49950
3.3	.49952	.49953	.49955	.49957	.49958	.49960	.49961	.49962	.49964	.49965
3.4	.49966	.49968	.49969	.49970	.49971	.49972	.49973	.49974	.49975	.49976
3.5	.49977	.49978	.49978	.49979	.49980	.49981	.49981	.49982	.49983	.49983
3.6	.49984	.49985	.49985	.49986	.49986	.49987	.49987	.49988	.49988	.49989
3.7	.49989	.49990	.49990	.49990	.49991	.49991	.49992	.49992	.49992	.49992
3.8	.49993	.49993	.49993	.49994	.49994	.49994	.49994	.49995	.49995	.49995
3.9	.49995	.49995	.49996	.49996	.49996	.49996	.49996	.49996	.49997	.49997



Denominator df_2	Numerator df_1 = 8	9	10	12	15	20	24	30
1	238.9	240.5	241.9	243.9	245.9	248.0	249.1	250.1
2	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46
3	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62
4	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75
5	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50
6	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81
7	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38
8	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08
9	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86
10	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70
11	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57
12	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47
13	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38
14	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31
15	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25
16	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19
17	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15
18	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11
19	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07
20	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04
21	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01
22	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98
23	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96
24	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94
25	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92
26	2.32	2.27	2.22	2.15	2.07	1.99	1.95	1.90
27	2.31	2.25	2.20	2.13	2.06	1.97	1.93	1.88
28	2.29	2.24	2.19	2.12	2.04	1.96	1.91	1.87
29	2.28	2.22	2.18	2.10	2.03	1.94	1.90	1.85
30	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84
40	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74
60	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65
120	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55
∞	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46



Denominator df_2	Numerator df_1 = 6	7	8	9	10	12	15	20
1	937.1	948.2	956.7	963.3	968.6	976.7	984.9	993.1
2	39.33	39.36	39.37	39.39	39.40	39.41	39.43	39.45
3	14.73	14.62	14.54	14.47	14.42	14.34	14.25	14.17
4	9.20	9.07	8.98	8.90	8.84	8.75	8.66	8.56
5	6.98	6.85	6.76	6.68	6.62	6.52	6.43	6.33
6	5.82	5.70	5.60	5.52	5.46	5.37	5.27	5.17
7	5.12	4.99	4.90	4.82	4.76	4.67	4.57	4.47
8	4.65	4.53	4.43	4.36	4.30	4.20	4.10	4.00
9	4.32	4.20	4.10	4.03	3.96	3.87	3.77	3.67
10	4.07	3.95	3.85	3.78	3.72	3.62	3.52	3.42
11	3.88	3.76	3.66	3.59	3.53	3.43	3.33	3.23
12	3.73	3.61	3.51	3.44	3.37	3.28	3.18	3.07
13	3.60	3.48	3.39	3.31	3.25	3.15	3.05	2.95
14	3.50	3.38	3.29	3.21	3.15	3.05	2.95	2.84
15	3.41	3.29	3.20	3.12	3.06	2.96	2.86	2.76
16	3.34	3.22	3.12	3.05	2.99	2.89	2.79	2.68
17	3.28	3.16	3.06	2.98	2.92	2.82	2.72	2.62
18	3.22	3.10	3.01	2.93	2.87	2.77	2.67	2.56
19	3.17	3.05	2.96	2.88	2.82	2.72	2.62	2.51
20	3.13	3.01	2.91	2.84	2.77	2.68	2.57	2.46
21	3.09	2.97	2.87	2.80	2.73	2.64	2.53	2.42
22	3.05	2.93	2.84	2.76	2.70	2.60	2.50	2.39
23	3.02	2.90	2.81	2.73	2.67	2.57	2.47	2.36
24	2.99	2.87	2.78	2.70	2.64	2.54	2.44	2.33
25	2.97	2.85	2.75	2.68	2.61	2.51	2.41	2.30
26	2.94	2.82	2.73	2.65	2.59	2.49	2.39	2.28
27	2.92	2.80	2.71	2.63	2.57	2.47	2.36	2.25
28	2.90	2.78	2.69	2.61	2.55	2.45	2.34	2.23
29	2.88	2.76	2.67	2.59	2.53	2.43	2.32	2.21
30	2.87	2.75	2.65	2.57	2.51	2.41	2.31	2.20
40	2.74	2.62	2.53	2.45	2.39	2.29	2.18	2.07
60	2.63	2.51	2.41	2.33	2.27	2.17	2.06	1.94
120	2.52	2.39	2.30	2.22	2.16	2.05	1.94	1.82
∞	2.41	2.29	2.19	2.11	2.05	1.94	1.83	1.71