1. (10%) A professor at a local community college noted that the grades of his students were normally distributed with a mean of 74 and a standard deviation of 10. The professor has informed us that 6.3 percent of his students received A's while only 2.5 percent of his students failed the course and received F's.
   (a) What is the minimum score needed to make an A?
   (b) What is the maximum score among those who received an F?
   (c) If there were 5 students who did not pass the course, how many students took the course?

2. (10%) In a restaurant, the proportion of people who order coffee with their dinner is 0.9. A simple random sample of 144 patrons of the restaurant is taken.
   (a) What is the probability that the proportion of people who will order coffee with their meal is between 0.85 and 0.875?
   (b) What is the probability that the proportion of people who will order coffee with their meal is at least 0.945?

3. (10%) A researcher reports survey results by stating that the standard error of the mean is 30. The population standard deviation is 600.
   (a) How large was the sample used in this survey?
   (b) What is the probability that the point estimate was within 36 of the population mean?

4. (10%) The website for the Bed and Breakfast Inns of North America gets approximately seven visitors per minute. Suppose the number of website visitors per minute follows a Poisson probability distribution.
   (a) Show the exponential probability density function for the time between website visits.
   (b) What is the probability no one will access the website in a 1-minute period?
   (c) What is the probability no one will access the website in a 12-second period?

5. (10%) A local health center noted that in a sample of 400 patients 80 were referred to them by the local hospital.
   (a) Provide a 95% confidence interval for all the patients who are referred to the health center by the hospital.
   (b) What size sample would be required to estimate the proportion of hospital referrals with a margin of error of 0.04 or less at 95% confidence?

6. (12%) An experiment has been conducted for four treatments with eight blocks.
   (a) Complete the following analysis of variance (ANOVA) table. Fill in (a1)—(a9).

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	p-value
Treatments	900	__(a2)__	__(a6)__	__(a9)__	0.0001
Blocks	400	__(a3)__	__(a7)__		
Error	__(a1)__	__(a4)__	__(a8)__		
Total	1800	__(a5)__			

   (b) Use $\alpha = 0.05$ to test for any significant differences. Write down the null and alternative hypothesis, and determine whether the null hypothesis should be rejected or not.

7. (12%) At a university, the historical mean of scholarship examination scores for freshman applications is 900. A historical population standard deviation $\sigma = 180$ is assumed known. Each year, the assistant dean uses a sampler of applications to determine whether the mean examination score for the new freshman applications has changed. Suppose a sample of 200 applications provides a sample mean $\bar{x} = 935$.
   (a) With a level of significance $\alpha = 0.05$, develop an appropriate hypothesis test.
   (b) What is the 95% confidence interval for the population mean examination score?

8. (10%) During the first few weeks of the new television season, the evening news audience proportions were recorded as ABC- 31%, CBS- 34%, and NBC- 35%. A sample of 600 homes yielded the following viewing audience data.

	Number of Homes
ABC	150
CBS	200
NBC	250

   We want to determine whether or not there has been a significant change in the number of viewing audience of the three networks.
   (a) State the null and alternative hypotheses to be tested.
   (b) Compute the test statistic. Suppose that the null hypothesis is to be tested at 95% confidence. What do you conclude?

9. (16%) A simple linear regression analysis resulted in the following information regarding a dependent variable (y) and an independent variable (x).

$$n = 10, \sum_{i=1}^{n} x_i = 90, \sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y}) = 466, \sum_{i=1}^{n} y_i = 170, \sum_{i=1}^{n}(x_i - \bar{x})^2 = 234, \sum_{i=1}^{n}(y_i - \bar{y})^2 = 1434$$

   (a) Use the least squares method to develop the estimated regression equation.
   (b) Compute the coefficient of determination (R^2) and the sample correlation coefficient. Explain.
   (c) Develop a 95% confidence interval for expected value for y when $x = 10$. $(t_{0.025,8} = 2.306)$

Table A: Chi-square distribution
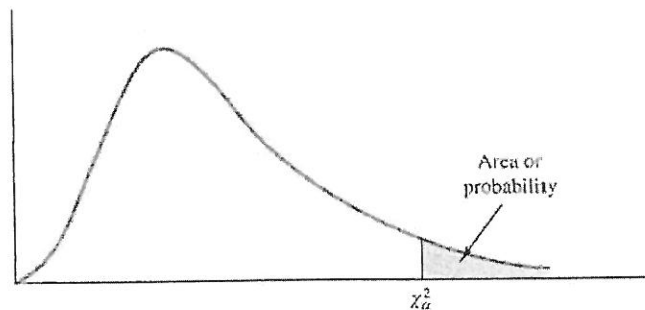
Entries in the table give χ_α^2 values, where α is the area or probability in the upper tail of the chi-square distribution. For example, with 10 degrees of freedom and a .01 area in the upper tail, $\chi_{01}^2 = 23.209$.

Degrees of Freedom	Area in Upper Tail									
	.995	.99	.975	.95	.90	.10	.05	.025	.01	.005
1	.000	.000	.001	.004	.016	2.706	3.841	5.024	6.635	7.879
2	.010	.020	.051	.103	.211	4.605	5.991	7.378	9.210	10.597
3	.072	.115	.216	.352	.584	6.251	7.815	9.348	11.345	12.838
4	.207	.297	.484	.711	1.064	7.779	9.488	11.143	13.277	14.860
5	.412	.554	.831	1.145	1.610	9.236	11.070	12.832	15.086	16.750

Table B: Cumulative probabilities for the standard normal distribution.

Cumulative probability
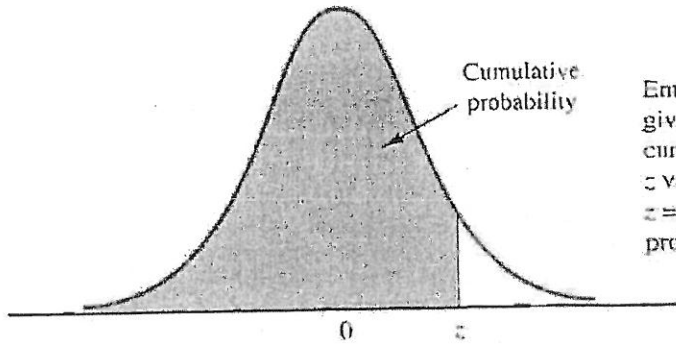
Entries in the table give the area under the curve to the left of the z value. For example, for $z = 1.25$, the cumulative probability is .8944.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9913
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9986	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990