9.3-1. Let μ_1, μ_2, μ_3 be, respectively, the means of three normal distributions with a common, but unknown, variance σ^2. In order to test, at the $\alpha = 0.05$ significance level, the hypothesis H_0: $\mu_1 = \mu_2 = \mu_3$ against all possible alternative hypotheses, we take a random sample of size 4 from each of these distributions. Determine whether we accept or reject H_0 if the observed values from the three distributions are, respectively, as follows:

x_1:	5	9	6	8
x_2:	11	13	10	12
x_3:	10	6	9	9

9.3-15. Ledolter and Hogg (see References) report that an operator of a feedlot wants to compare the effectiveness of three different cattle feed supplements. He selects a random sample of 15 one-year-old heifers from his lot of over 1000 and divides them into three groups at random. Each group gets a different feed supplement. Upon noting that one heifer in group A was lost due to an accident, the operator records the gains in weight (in pounds) over a six-month period as follows:

Group A:	500	650	530	680	
Group B:	700	620	780	830	860
Group C:	500	520	400	580	410

(a) Test whether there are differences in the mean weight gains due to the three different feed supplements.

8.4-3. Let X equal the weight (in grams) of a Hershey's grape-flavored Jolly Rancher. Denote the median of X by m. We shall test H_0: $m = 5.900$ against H_1: $m > 5.900$. A random sample of size $n = 25$ yielded the following ordered data:

5.625	5.665	5.697	5.837	5.863	5.870	5.878	5.884	5.908
5.967	6.019	6.020	6.029	6.032	6.037	6.045	6.049	
6.050	6.079	6.116	6.159	6.186	6.199	6.307	6.387	

(a) Use the sign test to test the hypothesis.

(b) Use the Wilcoxon test statistic to test the hypothesis.

(c) Use a t test to test the hypothesis.

(d) Write a short comparison of the three tests.

8.4-7. Let X equal the weight in pounds of a "1-pound" bag of carrots. Let m equal the median weight of a population of these bags. Test the null hypothesis H_0: $m = 1.14$ against the alternative hypothesis H_1: $m > 1.14$.

(a) With a sample of size $n = 14$, use the Wilcoxon statistic to define a critical region. Use $\alpha \approx 0.10$.

(b) What would be your conclusion if the observed weights were

1.12	1.13	1.19	1.25	1.06	1.31	1.12
1.23	1.29	1.17	1.20	1.11	1.18	1.23

(c) What is the p-value of your test?

8.4-15. With $\alpha = 0.05$, use the Wilcoxon statistic to test $H_0\colon m_X = m_Y$ against a two-sided alternative. Use the following observations of X and Y, which have been ordered for your convenience:

x:	−2.3864	−2.2171	−1.9148	−1.9097	−1.4883
	−1.2007	−1.1077	−0.3601	0.4325	1.0598
	1.3035	1.5241	1.7133	1.7656	2.4912
y:	−1.7613	−0.9391	−0.7437	−0.5530	−0.2469
	0.0647	0.2031	0.3219	0.3579	0.6431
	0.6557	0.6724	0.6762	0.9041	1.3571