

10.30) A random sample of size  $n_1 = 25$ , taken from a normal population with a standard deviation  $\sigma_1 = 5.2$ , has a mean  $\bar{x}_1 = 81$ . A second random sample of size  $n_2 = 36$ , taken from a different normal population with a standard deviation  $\sigma_2 = 3.4$ , has a mean  $\bar{x}_2 = 76$ . Test the hypothesis that  $\mu_1 = \mu_2$  against the alternative  $\mu_1 \neq \mu_2$ . Quote a P- value in your conclusion.

10.32) *Amstat News* ( December 2004) lists median salaries for associate professors of statistics at research institutions and at liberal arts and other institutions in the United States. Assume a sample of 200 associate professors from research institutions having an average salary of \$70,750 per year with a standard deviation of \$6000. Assume also a sample of 200 associate professors from other types of institutions having an average salary of \$65,200 with a standard deviation of \$5000. Test the hypothesis that the mean salary for associate professors in research institutions is \$2000 higher than for those in other institutions. Use a 0.01 level of significance.

10.36) A large automobile manufacturing company is trying to decide whether to purchase brand A or brand B tires for its new models. To help arrive at a decision, an experiment is conducted using 12 of each brand. The tires are run until they wear out. The results are:

Brand A:  $\bar{x}_1 = 37,900$  kilometers,

$s_1 = 5,100$  kilometers

Brand B:  $\bar{x}_1 = 39,800$  kilometers

$s_2 = 5,900$  kilometers

Test the hypothesis that there is no difference in the average wear of 2 brands of tires. Assume the populations to be approximately normally distributed with equal variances. Use a P-value.

10.40) In a study conducted at the Virginia Polytechnic Institute and State University , the plasma ascorbic acid levels of pregnant women were compared for smokers versus nonsmokers. Thirty-two women in the last three months of pregnancy, free of major health disorders, and ranging in age from 15 to 32 years, were selected for the study. Prior to the collection of 20 ml of blood, the participants were told to avoid breakfast, forgo their vitamin supplements, and avoid foods high in ascorbic acid content. From the blood samples, the following plasma ascorbic acid values of each subject were determined in milligrams per milliliters:

PLASMA ASCORBIC ACID VALUES

NONSMOKERS	SMOKERS
0.97	0.48
0.72	0.71
1.00	0.98
0.81	0.68
0.62	1.18
1.32	1.36
1.24	0.78
0.99	1.64
0.90	
0.74	
0.88	
0.94	
1.16	
0.86	
0.85	
0.58	
0.57	
0.64	
0.98	
1.09	
0.92	
0.78	
1.24	
1.18	

10.44) In Exercise 9.88 on page 315, use the t-distribution to test the hypothesis that the diet reduces a person's weight by 4.5 kilograms on the average against the alternative hypothesis that the mean difference in weight is less than 4.5 kilograms. Use P-value.

9.88) It is claimed that a new diet will reduce a person's weight by 4.5 kilograms on the average in a period of 2 weeks. The weights of 7 women who followed this diet were recorded before and after a 2-week period.

WOMEN	WEIGHT BEFORE	WEIGHT AFTER
1	58.5	60.0
2	60.3	54.9
3	61.7	58.1
4	69.0	62.1
5	64.0	58.5
6	62.6	59.9
7	56.7	54.4

10.46) In a study conducted by the Department of Human Nutrition and Foods at the Virginia Polytechnic Institute and State University the following data on the comparison of sorbic acid residuals in parts per million in ham immediately after dipping in a sorbate solution and after 60 days of storage were recorded:

**SORBIC ACID RESIDUALS IN HAM**

SLICE	BEFORE STORAGE	AFTER STORAGE
1	224	116
2	270	96
3	400	239
4	444	329
5	590	437
6	660	597
7	1400	689
8	680	576

Assuming the populations to be normally distributed, is there sufficient evidence, at the 0.05 level of significance, to say that the length of storage influences sorbic acid residual concentrations?

10.56) Suppose that, in the past 40% of all adults favored capital punishment. Do we have reason to believe that the proportion of adults favoring capital punishment today has increased if, in a random sample of 15 adults, 8 favor capital punishment? Use a 0.05 level of significance.

10.58) It is believed that at least 60% of the residents in a certain area favor an annexation suit by a neighboring city. What conclusion would you draw if only 110 in a sample of 200 voters favor the suit? Use a 0.05 level of significance.

10.64) In a study on the fertility of married women conducted by Martin O'Connell and Carolyn C. Rogers for the Census Bureau in 1979, two groups of childless wives aged 25 to 29 were selected at random and each wife was asked if she eventually planned to have a child. One group was selected from among those wives married five years. Suppose that 240 of 300 wives married less than two years planned to have children some day compared to 288 of the 400 wives married five years. Can we conclude that the proportion of wives married less than two years who planned to have children is significantly higher than the proportion of wives married five years? Make use of a P-value.

10.66) In a winter of an epidemic flu, 2000 babies were surveyed by a well-known pharmaceutical company to determine if the company's new medicine was effective after two days. Among 120 babies who had the flu and were given the medicine, 29 were cured within two days. Among 280 babies who had the flu but were not given the medication, 56 were cured within two days. Is there any significant indication that supports the company's claim of the effectiveness of the medicine?