10.16 Housework for women and men Do women tend to spend more time on housework than men? If so, how much more? Based on data from the National Survey of Families and Households, one study reported the results in the table for the number of hours spent in housework per week. (*Source*: Data from A. Lincoln, *Journal of Marriage and Family,* vol. 70, 2008, pp. 806–814.)

TRY

Housework Hours

Gender	Sample Size	Mean	Standard Deviation
Women	476	33.0	21.9
Men	496	19.9	14.6

a. Based on this study, calculate how many more hours, on the average, women spend on housework than men.

b. Find the standard error for comparing the means. What factor causes the standard error to be small compared to the sample standard deviations for the two groups?

c. Calculate the 95% confidence interval comparing the population means for women and men. Interpret the result including the relevance of 0 being within the interval or not.

d. State the assumptions upon which the interval in part c is based.

a. 33.0-19.9=13.1

b. $se = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = \sqrt{\frac{21.9^2}{476} + \frac{14.6^2}{496}} = 1.20$ **Because the sample size is large.**

c. 95% CI is 13.1 $\pm$1.98(1.20)=(10.72, 15.48). We can be 95% confident that…

Because 0 is not in the interval, we can conclude that there is a mean difference between the populations. It appears that the population mean for women is higher than the population mean for men.

d. quantitative, random and independent, approximately normal for each group.

10.34 Body dissatisfaction Female college student participation in athletics has increased dramatically over the past few decades. Sports medicine providers are aware of some unique health concerns of athletic women, including disordered eating. A study (M. Reinking and L. Alexander, *Journal of Athletic Training,* vol. 40, 2005, p. 47–51) compared disordered-eating symptoms and their causes for collegiate female athletes (in lean and nonlean sports) and nonathletes. The sample mean of the body dissatisfaction assessment score was 13.2 ($s = 8.0$) for 16 lean sport athletes (those sports that place value on leanness, including distance running, swimming, and gymnastics) and 7.3 ($s = 6.0$) for the 68 nonlean sport athletes. Assuming equal population standard deviations,

a. Find the standard error for comparing the means.

b. Construct a 95% confidence interval for the difference between the mean body dissatisfaction for lean sport athletes and nonlean sport athletes. Interpret.

a. $s = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}} = \sqrt{\frac{15(8.0)^2 + 67(6.0)^2}{16+68-2}} = 6.413$

$se = s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 6.413\sqrt{\frac{1}{16} + \frac{1}{68}} = 1.782$

b. 95% CI is $(\bar{x}_1 - \bar{x}_2) \pm t_{.025}(se)$ **= (13.2-7.3) $\pm$ 1.99(1.782) =(2.36, 9.44)**
We can be 95% confident that…

Because 0 is not in the interval, we can conclude that on average, the body dissatisfaction assessment score was higher for lean sport athletes than for nonlean sport athletes.

10.23 Some smoked but didn't inhale Refer to Examples 6–8 on nicotine dependence for teenage smokers. Another explanatory variable was whether a subject reported inhaling when smoking. The table reports descriptive statistics.

	HONC Score		
Group	**Sample Size**	**Mean**	**Standard Deviation**
Inhalers	237	2.9	3.6
Noninhalers	95	0.1	0.5

a. Show that the test statistic for H_0: $\mu_1 = \mu_2$ equals $t = 11.7$. If the population means were equal, explain why it would be nearly impossible by random variation to observe this large a test statistic.

df=258

b. What decision would you make about H_0, at common significance levels? Can you conclude which group had higher mean nicotine dependence? How?

c. State the assumptions for the inference in this exercise.

a. $se = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = \sqrt{\frac{(3.6)^2}{237} + \frac{(0.5)^2}{95}} = 0.24$, **t= (2.9-0.1)/0.24=11.7.**

df=258, the P-value=2P(t(258)>11.7)=0.000; if the population means were equal, the probability of getting a test statistic this large is about 0.

b. **Since the P-value is almost 0, we reject H_0. We have strong evidence that who reported inhaling have a higher population mean HONC score than those who did not report inhaling.**

c. **Quantitative, random and independent, approximate normal for each group.**

10.48 Test for blood pressure Refer to the previous exercise. The output shows some results of using software to analyze the data with a significance test.

```
Paired T for Before—After

             N      Mean     StDev     SE Mean
Before       3     150.0     15.0        8.660
After        3     130.0     10.0        5.774
Difference   3      20.0      5.0        2.887
T-Test of mean difference = 0 (vs not = 0):
T-Value = 6.93  P-Value = 0.020
```

a. State the hypotheses to which the reported P-value refers.

b. Explain how to interpret the P-value. Does the exercise program seem beneficial to lowering blood pressure?

c. What are the assumptions on which this analysis is based?

a. $H_0: \mu_1 = \mu_2; H_a: \mu_1 \neq \mu_2$

b. **The P-value of 0.020 indicates that if H_0 were true, there is 0.020 probability of getting a result at least as extreme as the value observed. Since the P-value is small and the T-value is positive, the exercise program dose seem beneficial to lowering blood pressure.**

c. **Quantitative, random and dependent, the difference scores are approximately normal, particularly if the sample is small.**