10.7 **a.** Since it is necessary to test a claim that the average amount saved, μ, is \$900, the hypothesis to be tested is two-tailed:

$$H_0\colon \mu = 900 \qquad \text{vs.} \qquad H_a\colon \mu \neq 900$$

b. The rejection region with $\alpha = .01$ is determined by a critical value of z such that $P[|z| > z_0] = .01$

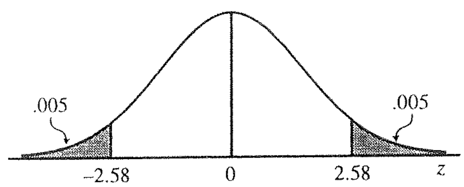

Figure 10.1

This value is $z_0 = 2.58$ (see Figure 10.1) and the rejection region is $|z| > 2.58$.

c. The test statistic is

$$z = \frac{\bar{y}-\mu}{\frac{\sigma}{\sqrt{n}}} \approx \frac{\bar{y}-\mu}{\frac{s}{\sqrt{n}}} = \frac{885-900}{\frac{30}{\sqrt{35}}} = -1.77$$

d. The observed value, $z = -1.77$, does not fall in the rejection region, and H_0 is not rejected. We cannot conclude that the average savings is different than claimed.

10.14 **a.** If we define p as the proportion of college students aged 30 years or more, then we test

$$H_0\colon p = .25 \qquad \text{vs.} \qquad H_a\colon p \neq .25$$

The test statistic is

$$z = \frac{\hat{p}-p_0}{\sqrt{\frac{p_0q_0}{n}}} = \frac{\frac{98}{300}-.25}{\sqrt{\frac{(.25)(.75)}{300}}} = 3.07$$

and the rejection region, with $\alpha = .05$ is $|z| > 1.96$. H_0 is rejected and we conclude that the 25% figure is not accurate.

b. Yes, the results do give evidence that the columnist's claim is too low.

10.58 The hypothesis to be tested is

$$H_0\colon \mu_1 - \mu_2 = 0 \qquad \text{vs.} \qquad H_a\colon \mu_1 - \mu_2 > 0.$$

Calculate

$$s^2 = \frac{9(.017)^2+12(.006)^2}{21} = .00014443$$

The test statistic is then

$$t = \frac{\bar{y}_1-\bar{y}_2}{\sqrt{s^2\left[\left(\frac{1}{n_1}\right)+\left(\frac{1}{n_2}\right)\right]}} = \frac{.041-.026}{\sqrt{s^2\left[\left(\frac{1}{10}\right)+\left(\frac{1}{13}\right)\right]}} = 2.97$$

The rejection region, with $\alpha = .05$ and 21 degrees of freedom, is $t > 1.721$, and the null hypothesis is rejected.