9.19.

a. The hypotheses are: H_0: $\mu_1 = \mu_2$ vs. H_A: $\mu_1 \neq \mu_2$

$$s_p = \sqrt{\frac{(16-1)32^2 + (25-1)30^2}{16+25-2}} = 30.785$$

Reject H_0 if $t < -2.0227$ or $t > 2.0227$.

b. $$t = \frac{(2{,}456 - 2{,}460) - 0}{30.785\sqrt{\frac{1}{16}+\frac{1}{25}}} = -.4058$$: Do not reject H_0.

9.20.

a. The hypotheses are: H_0: $\mu_1 = \mu_2$ vs. H_A: $\mu_1 \neq \mu_2$

$$df = 25 + 20 - 2 = 43$$

If $t > 2.0167$ or $t < -2.0167$ reject H_0, otherwise do not reject H_0.

b. $$s_p = \sqrt{\frac{(25-1)\,20^2 + (20-1)\,24^2}{25+20-2}} = 21.858$$

$$t = \frac{(430-405)-0}{21.858\sqrt{\frac{1}{25}+\frac{1}{20}}} = 3.812$$

Since $3.812 > 2.0167$ reject H_0

9.22.

a. The hypotheses are: H_0: $\mu_1 - \mu_2 \leq 0$ vs. H_A: $\mu_1 - \mu_2 > 0$

$$df = 75 + 80 - 2 = 153$$

The Decision Rule is: If $z > 1.645$ reject H_0, otherwise do not reject H_0

b. $$z = \frac{(5.30 - 5.10) - 0}{\sqrt{\frac{2.20^2}{75}+\frac{2.644^2}{80}}} = 0.513$$

Since $.513 < 1.645$ do not reject H_0

9.25.

H_0: $\mu_F - \mu_M \leq 1$ vs. H_A: $\mu_F - \mu_M > 1$

$$df = 60 + 60 - 2 = 118$$

$$z = \frac{(14.65 - 13.24) - 1}{\sqrt{\frac{1.2^2}{60}+\frac{1.56^2}{60}}} = 1.6136$$

Since $1.6136 < 1.645$ do not reject H_0 and conclude that the difference is not greater than 1.

9.35. Decision Rule:

If $z > 1.645$ or $z < -1.645$ reject H_0, otherwise do not reject H_0

$\bar{p} = (87+80)/(200+150) = 0.4771$, $\bar{p}_1 = 87/200 = 0.435$ and $\bar{p}_2 = 80/150 = 0.5333$

$z = [(0.435 – 0.5333)-.05]/\sqrt{(0.435(1-0.435)/200) + (0.533(1-0.533)/150)]} = -2.7594$

Since $z = -2.7594 < -1.645$ reject H_0, and conclude that the difference in the population proportions is not equal to 0.05.

9.37.

a. Decision Rule:
If $z > 2.05$ reject H_0, otherwise do not reject H_0
$\bar{p} = (30+24)/(60+80) = 0.3857$, $\bar{p}_1 = 30/60 = 0.5$ and $\bar{p}_2 = 24/80 = 0.3$
$z = [(0.5 – 0.3)-0]/ \sqrt{(0.3857)(1-.3857)[(1/60)+(1/80)]} = 2.4059$
Since $z = 2.4059 > 2.05$ reject H_0, and conclude there is a difference in the population proportions.

b. Looking in the standard normal table we see area associated with $z = 2.41$ is .4920. So the p-value is .00800 which is less than $\alpha = .02$ and again reject H_0.

9.40.

a. H_0: $p_p – p_g = 0$ vs. H_A: $p_p – p_g \neq 0$

$n_1 \bar{p}_1 = 22 > 5$; $n_1(1- \bar{p}_1) = 48 > 5$ and $n_2 \bar{p}_2 = 19 > 5$; $n_2(1- \bar{p}_2) = 31 > 5$

Decision Rule:
If $z > 1.96$ or $z < -1.96$ reject H_0, otherwise do not reject H_0

$\bar{p} = (22+19)/(70+50) = 0.3417$, $p_p = 22/70 = 0.3143$ and $p_g = 19/50 = 0.38$

$z = [(0.3143 – 0.38)-0]/\sqrt{(0.3417)(1-.3417)[(1/70)+(1/50)]} = -0.7481$

Since $z = -0.7481 > -1.96$ do not reject H_0, and conclude that there is no difference in the proportion of employees who give to United Way depending on whether the employer is a private business or a government agency.