Sec9.1 (6) Let μ_1 = average teachers' salary for all teachers in California, μ_2 =average teachers' salary for all teachers in New York.

$H_0 : \mu_1 = \mu_2$; $H_1 : \mu_1 \neq \mu_2$.

$\bar{X}_1 = 64510$; $\sigma_1 = 8200$; $\bar{X}_2 = 62900$; $\sigma_2 = 7800$

Test statistic: $z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} = 0.95$

Reject H_0 if test statistic $|z| > z_{\alpha/2} = z_{0.05} = 1.65$. Since $z = 0.95$, cannot reject H_0.

With $\alpha = 0.1$, do not have enough evidence to support the claim that the average salaries are different.

Sec9.1 (18) Let μ_1 = average credit card debt for a recent year in the population, μ_2 =average credit card debt for five years ago in the population.

$\bar{X}_1 = 9205$; $n_1 = 35$; $\bar{X}_2 = 6618$; $\sigma_2 = 35$; $\sigma_1 = \sigma_2 = 1928$

$\alpha = 0.05$; $z_{\alpha/2} = 1.96$

95% confidence interval for $(\mu_1 - \mu_2)$ is $(\bar{X}_1 - \bar{X}_2) \pm z_{\alpha/2}\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} = (1683.67, 3490.33)$.

With 95% confidence level, the difference in credit card debt$(\mu_1 - \mu_2)$ is estimated to be $(1683.67, 3490.33)$. Since both endpoints are positive, indicating significant evidence that average credit card debt is more than 5 years ago.

Sec9.2 (2) Let μ_1 = mean value of the tax-exempt proportion in city A, μ_2 = mean value of the tax-exempt proportion in city B.

$H_0 : \mu_1 = \mu_2$; $H_1 : \mu_1 \neq \mu_2$.

$\bar{X}_1 = 24.75$; $s_1 = 42.94$; $n_1 = 16$; $\bar{X}_2 = 25.965$; $s_2 = 72.745$; $n_2 = 16$

Test statistic: $T = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = -0.942$

$df = \min(n_1 - 1, n_2 - 1) = 15$ Reject H_0 if test statistic $|T| > t_{\alpha/2,15} = t_{0.025,15} = 2.131$.

Since $T = -0.942$, cannot reject H_0.

With $\alpha = 0.05$, we do not have enough evidence to support the tax collector's claim that the mean are different.

Sec9.3 (8) Let μ_d = population mean differences in weights(before − after).

$H_0 : \mu_d = 0$; $H_1 : \mu_d > 0$.

$\bar{d} = 4.833$; $s_d = 3.869$; $n = 6$; $df = n - 1 = 5$; $\alpha = 0.05$.

Test statistic: $T = \frac{\bar{d}}{s_d/\sqrt{n}} = 3.06$

Reject H_0 if test statistic $|T| > t_{5,0.05} = 2.015$. Since $T = 3.06$, reject H_0.

With $\alpha = 0.05$, have enough evidence to support the claim that the dogs lose weight.

Sec9.4 (10) Let p_1 = population proportion of mail carriers bitten in Clevelard, p_2 =population proportion of mail carriers bitten in Philadelphia.

$H_0 : p_1 = p_2$; $H_1 : p_1 \neq p_2$.

$\hat{p}_1 = 10/73 = 0.14$; $\hat{p}_2 = 16/80 = 0.2$; $\bar{p} = (10 + 16)/(73 + 80) = 0.17$;

Checking of condition for normal approximation:$n_1\bar{p} = 12.41$;$n_1(1 - \bar{p}) = 60.59$;$n_2\bar{p} = 13.6$;$n_2(1 - \bar{p}) = 66.4$; All large than 5.

Test statistic: $z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\bar{p}(1-\bar{p})(1/n_1 + 1/n_2)}} = -0.99$
Reject H_0 if test statistic $|z| > z_{\alpha/2} = 1.96$. Since $z = -0.99$, cannot reject H_0.
With $\alpha = 0.05$, do not have enough evidence to support the claim that the population proportion of mail carriers bitten are different in Clevelard and Philadelphia.

Sec9.4 (10) Checking for condition for normal approximation:$n_1\hat{p}_1 = 10$;$n_1(1-\hat{p}_1) = 63$;$n_2\hat{p}_2 = 16$;$n_2(1-\hat{p}_2) = 64$; All large than 5.
95% confidence interval for $p_1 - p_2$ is

$$(\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2}\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (-0.18, 0.06)$$

With 95% confidence level, the estimate of the population difference in proportions of mail carriers being bitten in the two cities is from -0.18 to 0.06, indicating an significant difference since zero is included in the interval.

Sec9.4 (24) Let p_1 = proportion of men in industrial sales in the population, p_2 = proportion of men in medical supply sales in the population.
$H_0 : p_1 = p_2$; $H_1 : p_1 \neq p_2$.
$\hat{p}_1 = 114/200 = 0.57$; $\hat{p}_2 = 80/200 = 0.4$; $\bar{p} = (114+80)/(200+200) = 0.485$;
Checking of condition for normal approximation:$n_1\bar{p} = 97$;$n_1(1-\bar{p}) = 103$;$n_2\bar{p} = 97$;$n_2(1-\bar{p}) = 103$; All large than 5.

Test statistic: $z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\bar{p}(1-\bar{p})(1/n_1 + 1/n_2)}} = 3.402$
Reject H_0 if test statistic $|z| > z_{\alpha/2} = 1.96$. Since $z = 3.402$, reject H_0.
With $\alpha = 0.05$, have enough evidence to support the claim that the proportions are different.

Sec9.5 (14) Let σ_1^2 = population variance in carbohydrate content for nonchocolate candy, σ_2^2 = population variance in carbohydrate content for chocolate candy.
$H_0 : \sigma_1^2 = \sigma_2^2$; $H_1 : \sigma_1^2 \neq \sigma_2^2$.
$s_1 = 11.2006$; $n_1 = 11$; $s_2 = 6.4985$; $n_2 = 13$
Test statistic: $F = \frac{s_1^2}{s_2^2} = 2.97$
Reject H_0 if test statistic $F > F_{0.05,10,12} = 2.75$. Since $F = 2.97$, reject H_0.
With $\alpha = 0.1$, have enough evidence to support the claim that the variances in carbohydrate grams of chocolate candy and nonchocolate candy are different.

*** End ***