8.3-10

(a)

$$z = \frac{y/n - 0.65}{\sqrt{(0.65)(0.35)/n}} \geq 1.96$$

(b)

$$z = \frac{414/600 - 0.65}{\sqrt{(0.65)(0.35)/600}} = 2.054 > 1.96$$

Reject H_0 at $\alpha = 0.025$.

(c) SInce the p-value $\approx P(Z \geq 2.054) = 0.02 < 0.025$, reject H_0 at an $\alpha = 0.025$ significance level.

(d) A 95% one-sided confidence interval for p is

$$[0.69 - 1.645\sqrt{(0.69)(0.31)/600}, 1] = [0.659, 1]$$

.

8.3-14

(a)

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})(1/n_1 + 1/n_2)}} \geq 1.645$$

(b)

$$z = \frac{0.15 - 0.11}{\sqrt{(0.1325)(0.8675)(1/900 + 1/700)}} = 2.341 > 1.645$$

, reject H_0

(c)

$$z = 2.341 > 2.326$$

, reject H_0

(d) The p-value $\approx P(Z \geq 2.341) = 0.0096$.

8.4-6

(a) The critical region is given by

$$\omega \geq 1.645\sqrt{15(16)(31)/6} = 57.9$$

.

(b) In the following display, those difference that were negative are underlined.

$\lvert x_i - 50\rvert$:	2	$\underline{2}$	2.5	3	4	$\underline{4}$	$\underline{4.5}$	$\underline{6}$	7
Ranks :	1.5	1.5	3	4	5.5	5.5	7	8	9
$\lvert x_i - 50\rvert$:	7.5	8	8	$\underline{14.5}$	15.5	21			
Ranks :	10	11.5	11.5	13	14	15			

Figure 1: Difference that were negative are underlined

The value of the Wilcoxon statistics is

$$\omega = 1.5 - 1.5 + 3 + 4 + \cdots + 15 = 50$$

Since

$$z = \frac{50}{\sqrt{15(16)(31)/6}} = 1.420 < 1.645$$

or since $\omega = 50 < 57.9$, we do not reject H_0.

(c) The approximate p-value is, using the one-unit correction,

$$p - value = P(W \geq 50) \approx P(Z \geq \frac{49}{\sqrt{15(16)(31)/6}}) = P(Z \geq 1.3915) = 0.0820$$

.

8.4-12

	<u>104</u>	184	196	197	248	<u>253</u>	260	279
Ranks:	1	2	3	4	5	6	7	8
	<u>300</u>	<u>308</u>	<u>323</u>	<u>331</u>	355	386	393	<u>396</u>
Ranks:	9	10	11	12	13	14	15	16
	<u>414</u>	432	450	<u>452</u>				
Ranks:	17	18	19	20				

Figure 2: The ordered combined sample with the 48-passenger bus values underlined are

The value of the Wilcoxon statistic is

$$\omega = 2 + 3 + 4 + 5 + 7 + 8 + 13 + 14 + 15 + 18 + 19 = 108$$

Since

$$z = \frac{108 - 11(21)/2}{\sqrt{9(11)(21)/12}} = -0.570 > -1.645,$$

We do not reject H_0.
8.5-10 Let $Y = \Sigma_{i=1}^{8} X_i$. Then Y has an Poisson distribution with mean $\mu = 8\lambda$.

(a)

$$\alpha = P(Y \geq 8|\lambda = 0.5) = 1 - P(Y \leq 7|\lambda = 0.5) = 1 - 0.949 = 0.051$$

.

(b)

$$K(\lambda) = 1 - \Sigma_{y=0}^{7} \frac{(8\lambda)^y e^{-8\lambda}}{y!}$$

.

(c)

$$K(0.75) = 1 - 0.744 = 0.256$$
$$K(1.00) = 1 - 0.453 = 0.547$$
$$K(1.25) = 1 - 0.220 = 0.780.$$

8.5-12

(a) $\Sigma_{i=1}^{3} X_i$ has gamma distribution with parameters $\alpha = 3$ and θ. Thus

$$K(\theta) = \int_0^2 \frac{1}{\Gamma(3)\theta^3} x^{3-1} e^{-x/\theta} dx;$$

(b)

$$K(\theta) = \int_0^2 \frac{x^2 e^{-x/\theta}}{2\theta^3} dx = \frac{1}{2\theta^3}[-\theta x^2 e^{-x/\theta} - 2\theta^2 x e^{-x/\theta} - 2\theta^3 e^{-x/\theta}]|_0^2$$
$$= 1 - \Sigma_{y=0}^{2} \frac{(2/\theta)^y}{y!} e^{-2/\theta}$$

(c)

$$K(2) = 1 - \Sigma_{y=0}^{2} \frac{1^y e^{-1}}{y!} = 1 - 0.920 = 0.080$$
$$K(1) = 1 - 0.677 = 0.323$$
$$K(0.5) = 1 - 0.238 = 0.762$$
$$K(0.25) = 1 - 0.014 = 0.986$$