Solution to HW# 4 (October, 21, 2008)

4. Page 348, **Chapter7,**

H_0: Distribution is 10%, 20%, 40%, 20%, 10%

H_1: H_0 is false $\alpha = 0.05$

$$\chi^2 = \Sigma \frac{(O - E)^2}{E}, \text{ df} = 4$$

Reject H_0 if $\chi^2 \geq 9.49$

	1	2	3	4	5	Total
Observed	12	18	50	10	10	100
Expected	10	20	40	20	10	100
$(O-E)^2/E$	0.4	0.2	2.5	5	0	8.1

$\chi^2 = 8.1$

Do not reject H_0 since $8.1 < 9.49$. We do not have significant evidence, α=0.05, to show that the distribution is not 10%, 20%, 40%, 20%, 10%.

12. Page 350, **Chapter7**

H_0: Therapy and severity are independent

H_1: Therapy and severity are not independent $\alpha = 0.05$

$$\chi^2 = \Sigma \frac{(O - E)^2}{E}, \text{ df} = 2$$

Reject H_0 if $\chi^2 \geq 5.99$

	Minimal	Moderate	Severe	Total
Medical	90 (70)	60 (60)	50 (70)	200
Non-Traditional	50 (70)	60 (60)	90 (70)	200
Total	140	120	140	400

$\chi^2 = 5.71 + 0 + 5.71 + 5.71 + 0 + 5.71 = 22.8.$

Reject H_0 since $22.8 > 5.99$. We have significant evidence, α=0.05, to show that therapy and severity are not independent, $p<0.005$.

21. Page 353, **Chapter7**

a) 95% CI for p. Check: min $(n\hat{p}, n(1-\hat{p}))$=min(150(0.34),150(0.66))=51

$$\hat{p} \pm Z_{1-\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$0.34 \pm (1.960)(0.039)$

0.34 ± 0.076

(0.264, 0.416)

b) $n = p(1-p)\left[\frac{Z_{1-\alpha/2}}{E}\right]^2 = 0.34(1-0.34)\left[\frac{1.960}{0.02}\right]^2 = 2155.1 \quad n = 2156.$

8. Page 402-403, Chapter 8,

Observed (expected)

	Preterm	Term	Total
Intensive Prenatal Care	12 (13.75)	43 (41.25)	55
Standard Prenatal Care	18 (16.25)	47 (48.75)	65
Total	30	90	120

a) RR = (12/55)/(18/65) = 0.79

b) $e\exp\left(\ln(RR) \pm Z_{1-\alpha/2}\sqrt{\frac{(d/c)}{n_0} + \frac{(b/a)}{n_1}}\right)$

$$\exp\left(\ln(0.79) \pm 1.96\sqrt{\frac{(47/18)}{65} + \frac{(43/12)}{55}}\right)$$

$$\exp(-0.24 \pm 0.64)$$

(0.42, 1.49)

c) No, do not reject H_0 because the confidence interval includes one.