HW#5, October 28, 2008

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a) **Observed (expected)**

	Migraine=1	Migraine= 0	Total
New	62 (59.2)	58 (60.8)	120
Standard	86 (88.8)	94 (91.2)	180
Total	148	152	300

b) RR = (62/120)/(86/180) = 1.08

H_0: RR = 1
H_1: RR $\neq$ 1 $\alpha = 0.05$
Reject if $\chi^2 > 3.84$.
All expected frequencies are at least 5.
$\chi^2 = 0.44$
Do not Reject H_0 since 0.44 < 3.84. There is no significant evidence, $\alpha = 0.05$, that RR $\neq$ 1.

c) H_0: $RR_{MH} = 1$
H_1: $RR_{MH} \neq 1$ $\alpha = 0.05$

Reject if $\chi^2 > 3.84$. $RR_{MH} = \dfrac{\Sigma \frac{a(c+d)}{N}}{\Sigma \frac{c(a+b)}{N}} = \dfrac{\frac{(30)(40)}{100} + \frac{(32(140)}{200}}{\frac{(35)(60)}{100} + \frac{(51)(60)}{200}} = 0.95$

$$\chi^2_{MH} = \frac{\left(\Sigma \frac{(ad-bc)}{N}\right)^2}{\Sigma \frac{(a+b)(c+d)(a+c)(b+d)}{(N-1)N^2}} = \frac{\left(\frac{(30)(5)-(30)(35)}{100} + \frac{(32)(89)-(28)(51)}{200}\right)^2}{\frac{(60)(40)(65)(35)}{(99)100^2} + \frac{(60)(140)(83)(117)}{(199)200^2}}$$

$\chi^2_{MH} = 0.23$. Do not Reject H_0 since 0.23 < 3.84.
We do not have significant evidence, $\alpha = 0.05$, to show that $RR_{MH} \neq 1$.

11. Chapter 9, page 459

a) H_0: $\mu_1 = \mu_2 = \mu_3$
H_1: H_0 is false.
$\alpha = 0.05$
F = 43.16, p=0.0001.
Reject Ho because p=0.0001<0.05.

b) $\eta^2 = 839.58/1043.83 = 0.80$

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H_0: $\mu_1 = \mu_2 = \mu_3$

H_1: H_0 is false. $\alpha = 0.05$

$\overline{X}_{..} = (21.6+24.8+27.9)/3 = 24.8$

$SS_b = \Sigma\, n_j\, (\overline{X}_{.j} - \overline{X}_{..})^2 = 100((21.6-24.8)^2 + (24.8-24.8)^2 + (27.9-24.8)^2) = 1985$

Source	SS	df	MS	F
Between	1985	2	992.5	320.2
Within	920.7	297	3.1	
Total	2905.7	299		

Reject H_0 if $F \geq F_{0.05}\,(2, 297) = F0.05\,(2, 200) = 3.04$

Reject H_0 since $320.2 > 3.04$. We have significant evidence, $\alpha = 0.05$, to show that the means are not all equal.