HW9 KEY

28 points total, 2 points per problem part unless otherwise noted.

Q1 Toxic Tomatoes

```r
#A
#New
5/50
```

```
## [1] 0.1
```

```r
#Old
9/50
```

```
## [1] 0.18
```

```r
#B
prop.test(c(5, 9), c(50, 50))
```

```
##
##  2-sample test for equality of proportions with continuity
##  correction
##
## data:  c(5, 9) out of c(50, 50)
## X-squared = 0.74751, df = 1, p-value = 0.3873
## alternative hypothesis: two.sided
## 95 percent confidence interval:
##  -0.23510963  0.07510963
## sample estimates:
## prop 1 prop 2
##   0.10   0.18
```

```r
#C
Sludge <- matrix(c(5, 45, 9, 41), byrow = TRUE, nrow = 2)
colnames(Sludge) <- c("Toxic", "NonToxic")
rownames(Sludge) <- c("New", "Old")
Sludge
```

```
##     Toxic NonToxic
## New     5       45
## Old     9       41
```

```r
chisq.test(Sludge)
```

```
##
##  Pearson's Chi-squared test with Yates' continuity correction
##
## data:  Sludge
## X-squared = 0.74751, df = 1, p-value = 0.3873
```

```r
#D
chisq.test(Sludge)$expected
```

```
##     Toxic NonToxic
```

```
## New     7       43
## Old     7       43
```

```r
#E
fisher.test(Sludge)
```

```
##
##  Fisher's Exact Test for Count Data
##
## data:  Sludge
## p-value = 0.3881
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.1235385 1.8596694
## sample estimates:
## odds ratio
##  0.5095856
```

F. Since all expected counts > 5, chi-square test is fine.

```r
#G
prop.test(c(5, 9), c(50, 50), alternative = "less")
```

```
##
##  2-sample test for equality of proportions with continuity
##  correction
##
## data:  c(5, 9) out of c(50, 50)
## X-squared = 0.74751, df = 1, p-value = 0.1936
## alternative hypothesis: less
## 95 percent confidence interval:
##  -1.00000000  0.05338758
## sample estimates:
## prop 1 prop 2
##   0.10   0.18
```

Q2 Anesthesia

```r
#A
#Drug1
(12+10)/45
```

```
## [1] 0.4888889
```

```r
#Drug2
(12+9)/45
```

```
## [1] 0.4666667
```

```r
#B (4 pts)
Anes <- matrix(c(12, 10, 9, 14), byrow=TRUE, nrow=2)
Anes
```

```
##      [,1] [,2]
## [1,]   12   10
## [2,]    9   14
```

```r
mcnemar.test(Anes)
```

```
##
##  McNemar's Chi-squared test with continuity correction
##
## data:  Anes
## McNemar's chi-squared = 0, df = 1, p-value = 1
```

Q3 Case Control Study

```r
library(epitools)
Birds <- matrix(c(328, 141, 101, 98), byrow = TRUE, nrow = 2)
colnames(Birds) <- c("Control", "Cancer")
rownames(Birds) <- c("NoBird", "YesBird")
oddsratio(Birds, method="wald")
```

```
## $data
##         Control Cancer Total
## NoBird      328    141   469
## YesBird     101     98   199
## Total       429    239   668
##
## $measure
##                          NA
## odds ratio with 95% C.I. estimate   lower    upper
##                  NoBird  1.000000      NA       NA
##                  YesBird 2.257145 1.60518 3.173915
##
## $p.value
##          NA
## two-sided   midp.exact fisher.exact   chi.square
##   NoBird            NA           NA           NA
##   YesBird 3.052348e-06 3.938413e-06 2.243712e-06
##
## $correction
## [1] FALSE
##
## attr(,"method")
## [1] "Unconditional MLE & normal approximation (Wald) CI"
```

3A. OR = 2.26, the YesBird group has higher odds of lung cancer.
3B. **(4 pts)** 95%CI = (1.605, 3.174)
Since the CI does NOT include one, we can conclude that there is a relationship between bird ownership and lung cancer.
3C. Chi-square p-value < 0.001.
Reject H0; conclude there is a relationship between bird ownership and lung cancer.