HW8 KEY

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

Q1 Contrasts

```r
library(tidyverse)
library(emmeans)
InData <- read.csv("C:/hess/STAT511_FA11/ASCII-comma/CH09/ex9-13.txt",quote=" ' ")
WtLoss <- InData %>%
        gather(key = "Trt", value = "Loss") %>%
        mutate(Trt = as_factor(Trt)) %>%
        mutate(Trt = fct_relevel(Trt, "S"))
#str(WtLoss)
Model <- lm(Loss ~ Trt, data = WtLoss)
emout <- emmeans(Model, "Trt")
contrast(emout,list(
        A = c(1, -0.25, -0.25, -0.25, -0.25),
        B = c(0, 0.5, 0.5, -0.5, -0.5),
        C = c(0, 0.5, -0.5, 0.5, -0.5),
        D = c(-1, 0.5, 0, 0.5, 0)))
```

```
##  contrast estimate    SE df t.ratio p.value
##  A           -2.12 0.350 45 -6.064  <.0001
##  B            0.28 0.313 45  0.893  0.3764
##  C           -0.47 0.313 45 -1.500  0.1407
##  D            1.89 0.384 45  4.924  <.0001
```

Q2 Binomial Distribution

```r
#A
MEAN <- 22*0.7
SD <- sqrt(22*(0.7)*(1-0.7))
MEAN; SD
```

```
## [1] 15.4
```

```
## [1] 2.149419
```

```r
#B
pbinom(15, 22, 0.7)
```

```
## [1] 0.5058237
```

```r
#C
pbinom(14, 22, 0.7)
```

```
## [1] 0.3287493
```

```r
#D
dbinom(15, 22, 0.7)
```

```
## [1] 0.1770744
```

```
#E
pbinom(17, 22, 0.7)-pbinom(14, 22, 0.7)
```

[1] 0.5067019

```
#F
1 - pbinom(17, 22, 0.7)
```

[1] 0.1645488

```
#G (Either answer OK)
1-pnorm((17-MEAN)/SD)
```

[1] 0.2283211

```
1-pnorm((18-MEAN)/SD)
```

[1] 0.1132106

```
#H
1-pnorm((17.5-MEAN)/SD)
```

[1] 0.1642825

Q3 Chronic Pain

    A. 0.53

    B. Confidence Interval

```
p <- 424/800
LB <- p - qnorm(0.975)*sqrt(p*(1-p)/800)
UB <- p + qnorm(0.975)*sqrt(p*(1-p)/800)
round(LB,3); round(UB,3)
```

[1] 0.495

[1] 0.565

C. **(4 pts)** H0: $\pi \leq 0.5$ vs HA: $\pi > 0.5$
Test Statistic:

```
p <- 424/800
Z <- (p - 0.5)/sqrt(0.5*(1-0.5)/800)
round(Z, 3)
```

[1] 1.697

p-value = 0.0448483
Reject H0; conclude true proportion is greater than 0.5.

Q4 Defective Items

    A. 0.08

    B. Approx 90% CI: (0.030, 0.179)

C. Exact 90% CI: (0.028, 0.174)

D. No, Since $0.08 < 0.115$.

```r
prop.test(4, 50, conf.level = 0.9)
```

```
##
##  1-sample proportions test with continuity correction
##
## data:  4 out of 50, null probability 0.5
## X-squared = 33.62, df = 1, p-value = 6.7e-09
## alternative hypothesis: true p is not equal to 0.5
## 90 percent confidence interval:
##  0.0301942 0.1792166
## sample estimates:
##    p
## 0.08
```

```r
binom.test(4, 50, conf.level = 0.9)
```

```
##
##  Exact binomial test
##
## data:  4 and 50
## number of successes = 4, number of trials = 50, p-value =
## 4.462e-10
## alternative hypothesis: true probability of success is not equal to 0.5
## 90 percent confidence interval:
##  0.02778767 0.17379116
## sample estimates:
## probability of success
##                   0.08
```

```r
3*sqrt( 0.08*(1- 0.08)/ 50)
```

```
## [1] 0.1151
```