STAT 455 Homework 05

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```
Game <- c(1:23) #game number
Made <- c(4, 5, 5, 5, 2, 7, 6, 9,
          4, 1, 13, 5, 6, 9, 7, 3,
          8, 1, 18, 3, 10, 1, 3) #number of free throws made
Attempt <- c(5, 11, 14, 12, 7, 10, 14, 15,
             12, 4, 27, 17, 12, 9, 12, 10,
             12, 6, 39, 13, 17, 6 ,12) #number of free throw attempt
Miss <- Attempt - Made #number of free throws missed
```

```
l <- length(Game) #23
FT <- c() #free throws vector (binary: 0 or 1)
G <- c() #game vector
for (i in 1:l){
    made.i <- c(rep(1, Made[i]))
    miss.i <- c(rep(0, Miss[i]))
    new.game <- c(rep(Game[i], length(made.i)+length(miss.i)))
    FT <- c(FT, made.i, miss.i)
    G <- c(G, new.game)}

K <- c()
for (j in 1:l){
  log.N.j <- log(Attempt[j])
  new.k <- rep(log.N.j, Attempt[j])
  K <- c(K, new.k)}

df.data <- data.frame("FT"=FT, "G"=G, "K"=K)
```

```
#test if pi_i- \alpha for each pi_i
#use linear regression
lin.reg <- glm(FT ~ 1, data=df.data)
alpha <- summary(lin.reg)$coef[1,1]
se.alpha <- summary(lin.reg)$coef[1,2]
z.star <- qnorm(0.975)
CI.alpha <- cbind(alpha - z.star*se.alpha, alpha + z.star*se.alpha)
print.CI.alpha <- paste(decimal(CI.alpha, dec), collapse=",")

#chisq test - check Goodness of Fit
table <- cbind(Made, Miss)
chi.test <- chisq.test(table)
X2 <- chi.test$statistic
pval <- chi.test$p.value

name <- c("$\\alpha$"
          , "Standard Error of $\\alpha$"
          , "Confidence Interval for $\\alpha$")
value <- c(decimal(alpha, dec),
           decimal(se.alpha, dec),
           paste("(", print.CI.alpha, ")"))
samerate <- data.frame("Statistic" = name, "Values" = value)
caption.samerate <- c("Model $\\pi_i = \\alpha$")
knitr::kable(samerate, align='lr',caption=paste(caption.samerate))
```

Table 1: Model $\pi_i = \alpha$

Statistic	Values
α	0.456
Standard Error of α	0.029
Confidence Interval for α	(0.399,0.513)

```
phi <- X2/(length(Game)-1)
se.phi <- sqrt(phi)*se.alpha
z.star <- qnorm(0.975)
CI.phi <- cbind(alpha - z.star*se.phi, alpha + z.star*se.phi)
print.CI.phi <- paste(decimal(CI.phi, dec), collapse=",")


name <- c("Dispersion, $\\hat{\\phi}$"
          , "Scale, $\\sqrt{\\hat{\\phi}}$"
          , "Standard Error of $\\alpha$, Adjusted"
          , "Confidence Interval for $\\alpha$, Adjusted")
value <- c(decimal(phi, dec), decimal(sqrt(phi), dec), decimal(se.phi, dec),
           paste("(", print.CI.phi, ")"))
samerate.phi <- data.frame("Statistic" = name, "Values" = value)
caption.samerate.phi <- c("Model $\\pi_i = \\alpha$, Estimate of $\\phi$ and Adjustements")
knitr::kable(samerate.phi, align="lr", caption=paste(caption.samerate.phi))
```

Table 2: Model $\pi_i = \alpha$, Estimate of ϕ and Adjustements

Statistic	Values
Dispersion, $\hat{\phi}$	1.614
Scale, $\sqrt{\hat{\phi}}$	1.270
Standard Error of α, Adjusted	0.037
Confidence Interval for α, Adjusted	(0.384,0.528)