Lab_Assignment_5

2024-11-01

Question 1:

```
Age <- c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
Nobserved <- c(47, 41, 26, 27, 21, 10, 12, 7, 4, 5)

age_1_fish <- 3000
survival_rate <- 0.6

Npredicted <- age_1_fish * survival_rate^(0:9)

proportion_predicted <- Npredicted / sum(Npredicted)

Npredicted_1 <- proportion_predicted * 200
Npredicted_1
```

```
##  [1] 80.4866721 48.2920033 28.9752020 17.3851212 10.4310727  6.2586436
##  [7]  3.7551862  2.2531117  1.3518670  0.8111202
```

```
chi_square <- sum((Nobserved - Npredicted_1)^2 / Npredicted_1)
chi_square
```

```
## [1] 88.52447
```

```
df <- length(Nobserved) - 1

p_value <- pchisq(chi_square, df = df, lower.tail = FALSE)
p_value
```

```
## [1] 3.217612e-15
```

```
predicted_probabilities <- proportion_predicted
chisq_test <- chisq.test(x = Nobserved, p = predicted_probabilities)
```

```
## Warning in chisq.test(x = Nobserved, p = predicted_probabilities): Chi-squared
## approximation may be incorrect
```

```
chisq_test
```

```
##
##  Chi-squared test for given probabilities
##
## data:  Nobserved
## X-squared = 88.524, df = 9, p-value = 3.218e-15
```

```
Age <- c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
Nobserved <- c(47, 41, 26, 27, 21, 10, 12, 7, 4, 5)

age_1_fish <- 3000
survival_rate <- 0.7
```

```r
Npredicted <- age_1_fish * survival_rate^(0:9)

proportion_predicted <- Npredicted / sum(Npredicted)

Npredicted_1 <- proportion_predicted * 200
Npredicted_1
```

```
##  [1] 61.744119 43.220883 30.254618 21.178233 14.824763 10.377334  7.264134
##  [8]  5.084894  3.559426  2.491598
```

```r
chi_square <- sum((Nobserved - Npredicted_1)^2 / Npredicted_1)
chi_square
```

```
## [1] 14.80831
```

```r
df <- length(Nobserved) - 1

p_value <- pchisq(chi_square, df = df, lower.tail = FALSE)
p_value
```

```
## [1] 0.09633789
```

```r
predicted_probabilities <- proportion_predicted
chisq_test <- chisq.test(x = Nobserved, p = predicted_probabilities)
```

```
## Warning in chisq.test(x = Nobserved, p = predicted_probabilities): Chi-squared
## approximation may be incorrect
```

```r
chisq_test
```

```
##
##  Chi-squared test for given probabilities
##
## data:  Nobserved
## X-squared = 14.808, df = 9, p-value = 0.09634
```

```r
Age <- c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
Nobserved <- c(47, 41, 26, 27, 21, 10, 12, 7, 4, 5)

age_1_fish <- 3000
survival_rate <- 0.5

Npredicted <- age_1_fish * survival_rate^(0:9)

proportion_predicted <- Npredicted / sum(Npredicted)

Npredicted_1 <- proportion_predicted * 200
Npredicted_1
```

```
##  [1] 100.0977517  50.0488759  25.0244379  12.5122190   6.2561095   3.1280547
##  [7]   1.5640274   0.7820137   0.3910068   0.1955034
```

```r
chi_square <- sum((Nobserved - Npredicted_1)^2 / Npredicted_1)
chi_square
```

```
## [1] 366.9158
```

```r
df <- length(Nobserved) - 1

p_value <- pchisq(chi_square, df = df, lower.tail = FALSE)
p_value
```

```
## [1] 1.549859e-73
```

```r
predicted_probabilities <- proportion_predicted
chisq_test <- chisq.test(x = Nobserved, p = predicted_probabilities)
```

```
## Warning in chisq.test(x = Nobserved, p = predicted_probabilities): Chi-squared
## approximation may be incorrect
```

```r
chisq_test
```

```
##
##  Chi-squared test for given probabilities
##
## data:  Nobserved
## X-squared = 366.92, df = 9, p-value < 2.2e-16
```

```r
Age <- c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
Nobserved <- c(47, 41, 26, 27, 21, 10, 12, 7, 4, 5)

age_1_fish <- 3000
survival_rate <- 0.8

Npredicted <- age_1_fish * survival_rate^(0:9)

proportion_predicted <- Npredicted / sum(Npredicted)

Npredicted_1 <- proportion_predicted * 200
Npredicted_1
```

```
##  [1] 44.811610 35.849288 28.679430 22.943544 18.354835 14.683868 11.747095
##  [8]  9.397676  7.518141  6.014512
```

```r
chi_square <- sum((Nobserved - Npredicted_1)^2 / Npredicted_1)
chi_square
```

```
## [1] 6.12432
```

```r
df <- length(Nobserved) - 1

p_value <- pchisq(chi_square, df = df, lower.tail = FALSE)
p_value
```

```
## [1] 0.7274143
```

```r
predicted_probabilities <- proportion_predicted
chisq_test <- chisq.test(x = Nobserved, p = predicted_probabilities)
chisq_test
```

```
##
##  Chi-squared test for given probabilities
##
## data:  Nobserved
## X-squared = 6.1243, df = 9, p-value = 0.7274
```

```r
Age <- c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
Nobserved <- c(47, 41, 26, 27, 21, 10, 12, 7, 4, 5)

age_1_fish <- 3000
survival_rate <- 1.0

Npredicted <- age_1_fish * survival_rate^(0:9)

proportion_predicted <- Npredicted / sum(Npredicted)

Npredicted_1 <- proportion_predicted * 200
Npredicted_1
```

```
##  [1] 20 20 20 20 20 20 20 20 20 20
```

```r
chi_square <- sum((Nobserved - Npredicted_1)^2 / Npredicted_1)
chi_square
```

```
## [1] 103.5
```

```r
df <- length(Nobserved) - 1

p_value <- pchisq(chi_square, df = df, lower.tail = FALSE)
p_value
```

```
## [1] 3.076736e-18
```

```r
predicted_probabilities <- proportion_predicted
chisq_test <- chisq.test(x = Nobserved, p = predicted_probabilities)
chisq_test
```

```
##
##  Chi-squared test for given probabilities
##
## data:  Nobserved
## X-squared = 103.5, df = 9, p-value < 2.2e-16
```

```r
Age <- c(1, 2, 3, 4, 5, 6, 7, 8, 9, 10)
Nobserved <- c(47, 41, 26, 27, 21, 10, 12, 7, 4, 5)

age_1_fish <- 3000
survival_rate <- 0.8

Npredicted <- age_1_fish * survival_rate^(0:9)

proportion_predicted <- Npredicted / sum(Npredicted)

Npredicted_1 <- proportion_predicted * 200
Npredicted_1
```

```
##  [1] 44.811610 35.849288 28.679430 22.943544 18.354835 14.683868 11.747095
##  [8]  9.397676  7.518141  6.014512
```

```r
chi_square <- sum((Nobserved - Npredicted_1)^2 / Npredicted_1)
chi_square
```

```
## [1] 6.12432
```

```r
df <- length(Nobserved) - 1

p_value <- pchisq(chi_square, df = df, lower.tail = FALSE)
p_value
```

```
## [1] 0.7274143
```

```r
predicted_probabilities <- proportion_predicted
chisq_test <- chisq.test(x = Nobserved, p = predicted_probabilities)
chisq_test
```

```
##
##  Chi-squared test for given probabilities
##
## data:  Nobserved
## X-squared = 6.1243, df = 9, p-value = 0.7274
```