

IT24100139





Pinthu D.I.U.

1.)

```
## (i)
## H0: P(A) = P(B) = P(C) = P(D) = 0.25 (choices are equally likely)
## H1: At least one snack type has probability  $\neq$  0.25 (not all equal)
```

```
counts <- c(A = 120, B = 95, C = 85, D = 100)
p0 <- rep(1/4, 4)
```

```
> counts <- c(A = 120, B = 95, C = 85, D = 100)
> p0 <- rep(1/4, 4)
> |
```

Environment	History	Connections	Tutorial
  Import Dataset	 133 MiB		
R	Global Environment		
values			
counts	Named num [1:4] 120 95 85 100		
p0	num [1:4] 0.25 0.25 0.25 0.25		

2.)

```
# (ii)
chisq_res <- chisq.test(x = counts, p = p0)

cat("Observed counts:\n"); print(counts)
cat("\nExpected counts (under H0):\n"); print(chisq_res$expected)

cat("\nChi-squared statistic:", unname(chisq_res$statistic),
    "\nDegrees of freedom:", unname(chisq_res$parameter),
    "\nP-value:", chisq_res$p.value, "\n")
```







```

> # (ii)
> chisq_res <- chisq.test(x = counts, p = p0)
>
> cat("Observed counts:\n"); print(counts)
Observed counts:
  A  B  C  D
120 95 85 100
> cat("\nExpected counts (under H0):\n"); print(chisq_res$expected)

Expected counts (under H0):
  A  B  C  D
100 100 100 100
>
> cat("\nChi-squared statistic:", unname(chisq_res$statistic),
+     "\nDegrees of freedom:", unname(chisq_res$parameter),
+     "\nP-value:", chisq_res$p.value, "\n")

Chi-squared statistic: 6.5
Degrees of freedom: 3
P-value: 0.0896625
> |

```

Environment	History	Connections	Tutorial
<div>   Import Dataset ▾  134 MiB ▾ </div>			
R ▾	Global Environment ▾		
Data			
 chisq_res		List of 9	
values			
counts		Named num [1:4] 120 95 85 100	
p0		num [1:4] 0.25 0.25 0.25 0.25	

3)

```

# (iii)
alpha <- 0.05
if (chisq_res$p.value < alpha) {
  cat("\nDecision: Reject H0 at 5% significance.\n",
      "Conclusion: There IS evidence that snack choices are not equally likely.\n")
} else {
  cat("\nDecision: Fail to reject H0 at 5% significance.\n",
      "Conclusion: There is NOT enough evidence to say snack choices differ from equal likelihood.\n")
}

expected <- sum(counts) * p0
x2_manual <- sum((counts - expected)^2 / expected)
cat("\nManual check of x^2:", x2_manual, "\n")

```

```

> # (iii)
> alpha <- 0.05
> if (chisq_res$p.value < alpha) {
+   cat("\nDecision: Reject H0 at 5% significance.\n",
+     "Conclusion: There IS evidence that snack choices are not equally likely.\n")
+ } else {
+   cat("\nDecision: Fail to reject H0 at 5% significance.\n",
+     "Conclusion: There is NOT enough evidence to say snack choices differ from equal likelihood.\n")
+ }

```

Decision: Fail to reject H0 at 5% significance.
Conclusion: There is NOT enough evidence to say snack choices differ from equal likelihood.








```

>
> expected <- sum(counts) * p0
> x2_manual <- sum((counts - expected)^2 / expected)
> cat("\nManual check of X^2:", x2_manual, "\n")

```

Manual check of X^2 : 6.5

```
> |
```

Environment	History	Connections	Tutorial
<div>   Import Dataset ▾  134 MiB ▾ </div>			
R ▾  Global Environment ▾			
Data			
 chisq_res	List of 9		
values			
alpha	0.05		
counts	Named num [1:4] 120 95 85 100		
expected	num [1:4] 100 100 100 100		
p0	num [1:4] 0.25 0.25 0.25 0.25		
x2_manual	6.5		