

Chi-Square Goodness of Fit (2 Questions)

Q1. Candy Colors

A company claims their candy packets contain equal proportions of **Red, Blue, Green, Yellow** candies. You buy a packet of 80 candies and count:

- Red = 18
- Blue = 22
- Green = 20
- Yellow = 20

Test at 5% significance level whether the observed distribution fits the expected equal distribution.

R hint:

```
observed <- c(18, 22, 20, 20)
chisq.test(x = observed, p = rep(1/4, 4))
```

Q2. Bus Arrival Times

A bus is expected to arrive equally across **4 time slots** in the morning:

- 7–8 AM, 8–9 AM, 9–10 AM, 10–11 AM.

You observe 60 arrivals in one week:

- 7–8 AM = 14
- 8–9 AM = 16
- 9–10 AM = 18
- 10–11 AM = 12

Test if the observed arrivals match the expected equal distribution.

R hint:

```
observed <- c(14, 16, 18, 12)
chisq.test(x = observed, p = rep(1/4, 4))
```

Chi-Square Independence Test (2 Questions)

Q3. Study Habits by Gender

A survey asks 100 students about their study habits (Group Study vs. Individual Study), split by gender:

	Group Study	Individual Study	Total
Male	25	20	45
Female	15	40	55
Total	40	60	100

Test whether study habits are independent of gender.

R hint:

```
data <- matrix(c(25, 20, 15, 40), nrow = 2, byrow = TRUE)
colnames(data) <- c("Group", "Individual")
rownames(data) <- c("Male", "Female")
chisq.test(as.table(data))
```

Q4. Product Preference by Age Group

A company surveys 120 people about preference for **Product A** or **Product B**, divided into two age groups:

	Product A	Product B	Total
Under 30	35	25	60
30 & Above	20	40	60
Total	55	65	120

Test whether product preference depends on age group.

R hint:

```
data <- matrix(c(35, 25, 20, 40), nrow = 2, byrow = TRUE)
colnames(data) <- c("ProductA", "ProductB")
rownames(data) <- c("Under30", "Above30")
chisq.test(as.table(data))
```