IT24103902

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Probability and Statistics - IT2120

Lab Sheet 09

IT24103902.R

```r
setwd("C:\\Users\\User\\Desktop\\IT24103902")

# Exercise Question 1
# Part (i): Generate random sample of size 25
baking_time <- rnorm(25, mean = 45, sd = 2)
print("Generated baking times:")
print(baking_time)

# Part (ii): Hypothesis test
# H0: μ ≥ 46 minutes (average baking time is at least 46 minutes)
# H1: μ < 46 minutes (average baking time is less than 46 minutes)
# Significance level: 5% (α = 0.05)

test_result <- t.test(baking_time, mu = 46, alternative = "less")
print(test_result)

# Extract specific values
test_statistic <- test_result$statistic
p_value <- test_result$p.value
confidence_interval <- test_result$conf.int

cat("\n--- Extracted Values ---\n")
cat("Test Statistic (t):", test_statistic, "\n")
cat("P-value:", p_value, "\n")
cat("Confidence Interval:", confidence_interval, "\n")

# Conclusion based on p-value approach
if (p_value < 0.05) {
  conclusion <- "Reject H0: There is sufficient evidence that average baking time is less than 4
} else {
  conclusion <- "Do not reject H0: There is insufficient evidence that average baking time is le
}

cat("\nConclusion:", conclusion, "\n")
```

R 4.5.1 · C:/Users/User/Desktop/IT24103902/

```
> setwd("C:\\Users\\User\\Desktop\\IT24103902")
>
> # Exercise Question 1
> # Part (i): Generate random sample of size 25
> baking_time <- rnorm(25, mean = 45, sd = 2)
> print("Generated baking times:")
[1] "Generated baking times:"
> print(baking_time)
 [1] 42.42107 44.90547 43.23260 46.87097 41.17666 46.62508 44.52167 45.47144 48.36243 44.47972
[11] 43.75352 46.40977 46.74620 39.03651 43.37132 45.67965 45.34632 45.48043 43.48361 43.03810
[21] 44.37464 43.35404 45.36403 43.86660 45.41618
>
> # Part (ii): Hypothesis test
> # H0: μ ≥ 46 minutes (average baking time is at least 46 minutes)
> # H1: μ < 46 minutes (average baking time is less than 46 minutes)
> # Significance level: 5% (α = 0.05)
>
> test_result <- t.test(baking_time, mu = 46, alternative = "less")
> print(test_result)

        One Sample t-test

data:  baking_time
t = -3.7795, df = 24, p-value = 0.0004591
alternative hypothesis: true mean is less than 46
```

```
--- Extracted Values ---
> cat("Test Statistic (t):", test_statistic, "\n")
Test Statistic (t): -3.779454
> cat("P-value:", p_value, "\n")
P-value: 0.00045909
> cat("Confidence Interval:", confidence_interval, "\n")
Confidence Interval: -Inf 45.18533
>
> # Conclusion based on p-value approach
> if (p_value < 0.05) {
+   conclusion <- "Reject H0: There is sufficient evidence that average baking time is less than 46
minutes."
+ } else {
+   conclusion <- "Do not reject H0: There is insufficient evidence that average baking time is les
s than 46 minutes."
+ }
>
> cat("\nConclusion:", conclusion, "\n")

Conclusion: Reject H0: There is sufficient evidence that average baking time is less than 46 minute
s.
>
```