

IT2120 - Probability and Statistics

Lab Sheet 09

IT24102477

```
# Step 1: Set seed for reproducibility
set.seed(123)

# Step 2: Define parameters
mean_time <- 45      # Population mean (minutes)
sd_time <- 2         # Population standard deviation (minutes)
sample_size <- 25    # Sample size

# Step 3: Generate a random sample of baking times
baking_time <- rnorm(sample_size, mean = mean_time, sd = sd_time)

# Step 4: View the sample
baking_time      # Display the generated sample
mean(baking_time) # Sample mean
sd(baking_time)  # Sample standard deviation

# Step 5: Perform a one-sample t-test
# H0: mu = 46
# H1: mu < 46
test_result <- t.test(baking_time, mu = 46, alternative = "less")

# Step 6: View test result
test_result

# Step 7: Decision based on p-value
if(test_result$p.value < 0.05){
  cat("Reject H0: The average baking time is less than 46 minutes.\n")
} else {
  cat("Do not reject H0: Insufficient evidence that the average baking time is less than 46 minutes.\n")
}
```

```

> # Step 1: Set seed for reproducibility
> set.seed(123)
>
> # Step 2: Define parameters
> mean_time <- 45      # Population mean (minutes)
> sd_time <- 2         # Population standard deviation (minutes)
> sample_size <- 25    # Sample size
>
> # Step 3: Generate a random sample of baking times
> baking_time <- rnorm(sample_size, mean = mean_time, sd = sd_time)
>
> # Step 4: View the sample
> baking_time          # Display the generated sample
[1] 43.87905 44.53965 48.11742 45.14102 45.25858 48.43013 45.92183
[8] 42.46988 43.62629 44.10868 47.44816 45.71963 45.80154 45.22137
[15] 43.88832 48.57383 45.99570 41.06677 46.40271 44.05442 42.86435
[22] 44.56405 42.94799 43.54222 43.74992
> mean(baking_time)    # Sample mean
[1] 44.93334
> sd(baking_time)      # Sample standard deviation
[1] 1.893465
>
> # Step 5: Perform a one-sample t-test
> # H0: mu = 46
> # H1: mu < 46
> test_result <- t.test(baking_time, mu = 46, alternative = "less")
>
> # Step 6: View test result
> test_result

      One Sample t-test

data:  baking_time
t = -2.8167, df = 24, p-value = 0.004776
alternative hypothesis: true mean is less than 46
95 percent confidence interval:
 -Inf 45.58124
sample estimates:
mean of x
 44.93334

>
> # Step 7: Decision based on p-value
> if(test_result$p.value < 0.05){
+   cat("Reject H0: The average baking time is less than 46 minutes.\n")
+ } else {
+   cat("Do not reject H0: Insufficient evidence that the average baking time is less than 46 minutes.\n")
+ }
Reject H0: The average baking time is less than 46 minutes.
> |

```
