

Probability and Statistics - IT2120

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> #1. Assume that the time taken to bake a batch of cookies is normally distributed with mean 45 minutes and standard deviation 2 minutes.
>
> #i. Generate a random sample of size 25 for the baking time.
> baking_times <- rnorm(25, mean=45, sd=2)
> baking_times
[1] 48.45217 47.46217 45.26818 44.25819 43.74044 44.93553 46.26111 45.41109 44.05264 43.42676 47.44011 44.96286
[13] 45.60647 48.70430 44.63458 42.67482 46.61481 45.39083 41.56902 43.90321 44.03029 45.14040 42.42271 46.57888
[25] 46.75367
> #ii. Test whether the average baking time is less than 46 minutes at a 5% level of significance.
> #Hypothesis: H0:  $\mu \geq 46$  vs H1:  $\mu < 46$ 
> t.test(baking_times, mu=46, alternative="less")

One Sample t-test

data:  baking_times
t = -2.2392, df = 24, p-value = 0.01734
alternative hypothesis: true mean is less than 46
95 percent confidence interval:
 -Inf 45.80836
sample estimates:
mean of x
45.18781

> #Conclusion: Since p value (0.0005364) is less than 0.05, we can reject H0 at 5% level of significance. Therefore, we can conclude that the true mean baking time is less than 46.
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