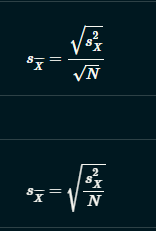
problem\_set\_5

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# Hand Calculations

set.seed(09282021)  
  
values = rnorm(10, mean = 21, sd = 4.7)  
  
values

## [1] 24.46518 24.87911 27.42912 18.65325 25.87302 34.38246 19.40068 20.13757  
## [9] 19.92043 22.30778

You are interested in the amount of hot dogs a competitive eater can eat in 10 minutes. You have a sample of 10 individuals from a local competitive eating group and the amount of hot dogs that they can eat in 10 minutes. From Nathan’s Hot Dog Eating Contest records, you know that every competitive eater has a log of the amount of hot dogs they can eat in a 10 minute span, with the average being 18 hot dogs. You are now interested in knowing whether your sample of competitive eaters can eat significantly less or more hot dogs than everyone in Nathan’s records. Answer all the steps comparing your sample to the population.

1. Create your null and research/alternative hypotheses (in words)
2. Select an alpha
3. Check assumptions
4. Get the sample size
5. Get the population mean
6. Calculate the sample mean
7. Calculate the variance/standard deviation (SD)
8. Calculate the estimated standard error (SE)
9. Calculate degrees of freedom (df)
10. Calculate your t obtained value
11. Compare t-value to t-critical value (use t-table)
12. Check to see what hypothesis you should retain/reject
13. Calculate the confidence intervals
14. Write up report on statistical significance.

# SPSS Calculations

You are interested in the average amount of time college students spend checking their emails according to the MTUAS scale. You have a sample of 372 college students from a local state university. You know all the students that have stated the amount of time they spend checking their emails is on average about 6.5 on the MTUAS scale. You are interested in whether or not your sample of college students is significantly different from the rest of the students in the amount of time they spend checking their emails according to the MTUAS. Answer all the steps comparing your sample to the population in SPSS.

1. Create your null and research/alternative hypotheses (in words)
2. Select an alpha
3. Check assumptions
4. Get the sample size
5. Get the population mean
6. Calculate the sample mean
7. Calculate the variance/standard deviation (SD)
8. Calculate the estimated standard error (SE)
9. Calculate degrees of freedom (df)
10. Calculate your t obtained value
11. Compare t-value to t-critical value (use t-table)
12. Check to see what hypothesis you should retain/reject
13. Calculate the confidence intervals
14. Write up report on statistical significance.

# Answers

1. Create your null and research/alternative hypotheses (in words)

H0: no differences between our sample and the population on time holding breath underwater

H1: sample hold breath longer or shorter than all records/population

1. Select an alpha

.05

1. Check assumptions

good

1. Get the sample size

10

1. Get the population mean

3.5 minutes

1. Calculate the sample mean

3+ 5 +4 +5 +2 +4 +6 +2 +6 +1

## [1] 38

38/10

## [1] 3.8

# sample mean is 3.8

1. Calculate the variance/standard deviation (SD)

3 +5 +4 +5 +2 +4 +6 +2 +6 +1

## [1] 38

# sum is 38

38^2

## [1] 1444

# 1444

3^2 +5^2 +4^2 +5^2 +2^2 +4^2 +6^2 +2^2 +6^2 +1^2

## [1] 172

# 172

1444/10

## [1] 144.4

144.4

## [1] 144.4

172 - 144.4

## [1] 27.6

# 27.6

27.6/9

## [1] 3.066667

1. Calculate the estimated standard error (SE)

# population mean = 3.5  
# sample mean = 3.8  
# estimated population variance = 3.067   
# sample size/number of observations = 10  
  
sqrt(3.067/10)

## [1] 0.553805

# se .55

1. Calculate degrees of freedom (df)

10 - 1

## [1] 9

# df of 9

1. Calculate the t-score

# population mean = 3.5  
# sample mean = 3.8  
# estimated population variance = 3.067   
# sample size/number of observations = 10  
# standard error = .55  
  
(3.8 - 3.5)/.55

## [1] 0.5454545

# t value of .55

.55 < 2.26

t(9) = .55, p > .05

1. Check to see what hypothesis you should retain/reject

Retain the null hypothesis.

1. Calculate the confidence intervals

Not statistically significant. Our value is not in the region of rejection and calculating confidence intervals is not necessary.

1. Write up report on statistical significance.

Our one-sample t-test did not find significant differences between the sample (M = 3.8) and the population (M = 3.5) in regard to amount of time holding their breath.