

AP Statistics - t Intervals and t Tests for a Mean - Worksheet

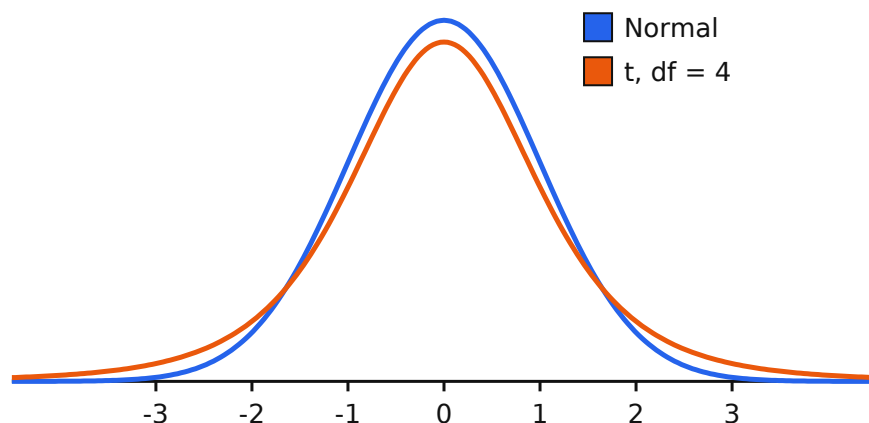
Common Core AP STAT 7.1, AP STAT 7.2, AP STAT 7.3, AP STAT 7.4, AP STAT 7.5, HSS-IC.B.4 · maths-pdf.fr/en/

Name: _____ Class: _____ Date: ____/____/____

These 20 problems practice AP Statistics topics 7.1 to 7.5. You will find t critical values and standard errors, build and interpret one-sample t intervals, run one-sample t tests and matched-pairs tests, and check conditions with graphs.

AP Statistics · Common Core State Standards: **AP STAT 7.1, AP STAT 7.2, AP STAT 7.3, AP STAT 7.4, AP STAT 7.5, HSS-IC.B.4**

Exercise 1 - t versus normal



The t distribution has heavier tails than the normal; it approaches the normal as degrees of freedom grow.

Describe two differences between the t distribution with 4 degrees of freedom and the standard normal distribution.

Exercise 2 - Degrees of freedom and t^*

df	90%	95%	99%
5	2.015	2.571	4.032
11	1.796	2.201	3.106
20	1.725	2.086	2.845
30	1.697	2.042	2.750
z*	1.645	1.960	2.576

Critical values t^* decrease toward z^* as df grows.

Find df and the critical value t^* for a 95% interval from a sample of size 21, and for a 99% interval from a sample of size 31.

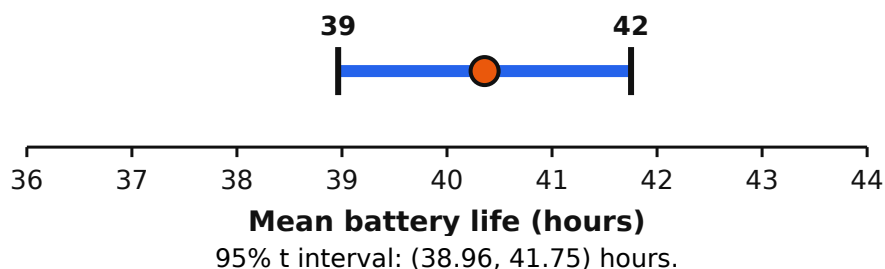
Exercise 3 - Standard error

A random sample of 25 sleep times has mean 7.2 hours and standard deviation 1.4 hours. Find the standard error of the mean.

Exercise 4 - Compute an interval

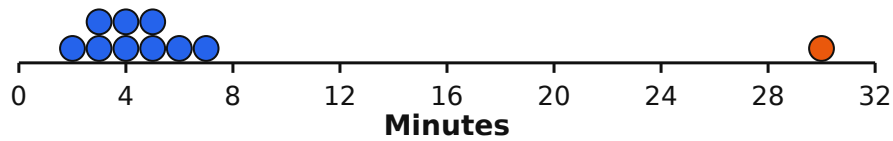
Using the sleep data ($n = 25$, mean 7.2, $s = 1.4$), find a 95% confidence interval for the mean sleep time of all students at the school.

Exercise 5 - Interpret the interval



Interpret the battery interval (38.96, 41.75) in context.

Exercise 6 - Check the Normal condition



Ten wait times in minutes.

A random sample of 10 wait times (minutes) is graphed. Is a t interval appropriate?

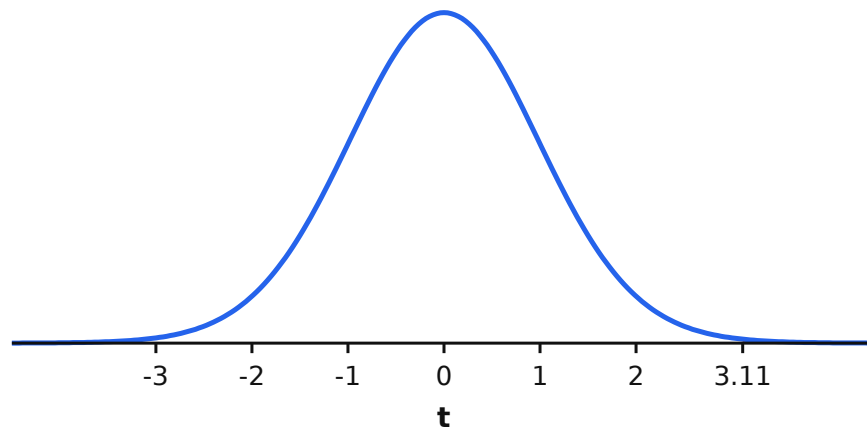
Exercise 7 - Write hypotheses

A pizza shop claims its mean delivery time is 30 minutes. A customer group thinks it is longer. Write H_0 and H_a and define the parameter.

Exercise 8 - Compute t

A random sample of 40 deliveries has mean 33.2 minutes and standard deviation 6.5 minutes. Compute the t statistic for $H_0: \mu = 30$.

Exercise 9 - p-value



Right-tail p-value.

For the delivery data, $df = 39$ and $H_a: \mu > 30$. Find the p-value.

Exercise 10 - Conclusion

State a conclusion for the delivery test at $\alpha = 0.05$ (p-value 0.0017).

Exercise 11 - Two-sided t test

Body temperatures: a random sample of 36 adults has mean 98.2 degrees F and standard deviation 1.1 degrees F. Test whether the true mean differs from 98.6 degrees F at $\alpha = 0.05$.

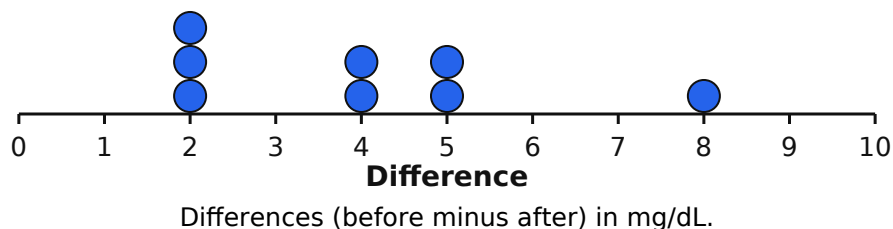
Exercise 12 - Interval and test

A 95% t interval for μ is (41.2, 46.8). A two-sided test of $H_0: \mu = 40$ at $\alpha = 0.05$ would lead to what conclusion?

Exercise 13 - Matched pairs differences

Eight patients' cholesterol (mg/dL) before and after a diet: before 182, 195, 170, 188, 201, 176, 190, 185; after 178, 190, 168, 180, 199, 172, 185, 183. Find the differences (before minus after), their mean, and their standard deviation.

Exercise 14 - Matched pairs interval



Construct a 95% interval for the true mean reduction (before minus after).

Exercise 15 - Matched pairs test

Test whether the diet lowers cholesterol on average ($H_0: \mu_d = 0$, $H_a: \mu_d > 0$) using the differences above.

Exercise 16 - Effect of n

Two samples have the same mean 50 and $s = 10$, one with $n = 16$ and one with $n = 64$.

Compare the 95% margins of error.

Exercise 17 - Read output

Variable	n	Mean	StDev	SE Mean
Time	20	52.3	6.8	1.52

Output for a one-sample t procedure.

The output shows summary statistics for a random sample of completion times (minutes). Verify the standard error and find a 90% interval for the mean.

Exercise 18 - Outlier warning

A random sample of 12 salaries (in thousands) includes one value of 400 while the others are between 40 and 70. Explain why a t interval for the mean is questionable.

Exercise 19 - Left-tailed test

A company claims its batteries last at least 25 hours. A random sample of 50 batteries has mean 24.1 hours and $s = 3.9$ hours. Test at $\alpha = 0.05$ whether the mean is less than 25.

Exercise 20 - Multi-step

A random sample of 30 apartments has a mean rent of \$1,350 and $s = \$180$. (a) Find a 99% confidence interval for the mean rent. (b) Is \$1,300 plausible?