

MS 150 Statistics spring 2007 test two • Name:

Part I: Confidence interval for a mean

Palikir campus

Building	Cost \$/feet²
Classroom A	0.26
Classroom B	0.16
Cafeteria C	0.39
Dormitory D	0.19
Dormitory E	0.18
Faculty F	0.80
Faculty F2	0.67
Administration G	0.53
Library H	0.52
Bookstore K	0.57
Agriculture L	0.55

The table provides the power cost per square foot for the buildings on the Palikir campus. Construct a 95% confidence interval for the population mean cost in dollars per square foot (feet²).

1. _____ Determine the sample size n .
2. _____ Calculate \bar{x} .
3. _____ Calculate the sample standard deviation s_x .
4. _____ Calculate the standard error of the mean $\sigma_{\bar{x}}$.
5. _____ What is the confidence level c ?
6. _____ Calculate t-critical t_c .
7. _____ Calculate the margin of error for the mean E .
8. Write out the 95% confidence interval:
_____ $\leq \mu \leq$ _____
9. The 95% confidence interval for the population mean cost in dollars per square foot provides guidance for cost savings at the college. Given limited budgets even for power reduction, the administration wants to spend money on conserving power first in those building where the most savings might be realized. Buildings that exceed the 95% confidence interval for the mean power cost are where the most savings are likely to be realized in a first round of energy conservation measures. What buildings have a cost per square foot that exceeds the 95% confidence interval?

Part II: Confidence interval for a population proportion

You will be given a penny. Using a sample size of ten flips, you will be investigating whether a population probability of 0.50 for heads is a possibility. Flip the penny ten times. Record the number of heads r . Use the number of heads/ten flips as your sample proportion p for the proportion of heads ($p = r/n$). Find the 95% confidence interval for the population proportion P . Use a spreadsheet to make your calculations, rounding answers to two decimal places on this test.

10. _____ Write the sample size n .

11. _____ Write the number of heads r .
12. _____ Write down the sample proportion p .
13. _____ Calculate q .
14. _____ Calculate the standard error of the proportion.
15. _____ What is the confidence level c ?
16. _____ Calculate t-critical t_c .
17. _____ Calculate the margin of error E for the proportion.
18. Write out the 95% confidence interval:
 _____ $\leq \mathbf{P} \leq$ _____
19. _____ Is a population proportion of $\mathbf{P} = 0.50$ a possible population proportion based on your experiment?

Formulas are written for OpenOffice.org Calc. Replace semi-colons with commas for Excel.

Confidence interval statistics

Statistic or Parameter	Symbol	Equations	OpenOffice
Degrees of freedom	df	$= n - 1$	$=\text{COUNT}(\text{data})-1$
Find a t-critical t_c value from a confidence level c and sample size n	t_c		$=\text{TINV}(1-c;n-1)$
Standard error of the sample mean	$\sigma_{\bar{x}}$	$\frac{sx}{\sqrt{n}}$	$=sx/\text{SQRT}(n)$
Calculate the margin of error E for a mean for $n \geq 5$ using sx .	E	$t_c \frac{sx}{\sqrt{n}}$	$=t_c * sx/\text{SQRT}(n)$
Calculate a confidence interval for a population mean μ from the sample mean \bar{x} and margin of error E for the mean.		$\bar{x} - E \leq \mu \leq \bar{x} + E$	
Number of successes or desired results in a sample	r		
Proportion of successes or desired result in a sample	p	$r \div n$	$=r/n$
Proportion of non-successes, not the desired, or alternate result in a sample	q	$1 - p$	$=1-p$
Standard error of a proportion p	σ_p	$\sqrt{\frac{pq}{n}}$	$=\text{SQRT}(p*q/n)$
Margin of error E for a proportion p	E	$t_c \sqrt{\frac{pq}{n}}$	$=\text{TINV}(1-c;n-1)*\text{SQRT}(p*q/n)$
Calculate a confidence interval for a population proportion \mathbf{P} from the sample proportion p and the margin of error E for the mean.		$p - E \leq \mathbf{P} \leq p + E$	