

2510-001: QUIZ WEEK 11

COLTON GRAINGER
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Your name (print clearly in capital letters): _____

Read Me Carefully

- This quiz is out of 10 points.
- Please answer each graded question, and return this quiz to me by Friday, November 8th at **8:30am**.
- You do not need to show work.
- You may not collaborate.
- Please use *your notes, a calculator, and a piece of scratch paper*.
- You may complete any of the *additional questions* to earn back points on either this quiz or the Week 10 quiz.

Graded Questions

- (1) (2 points) It is estimated that 2% of the world's population has green eyes. How many CU students would be needed to estimate the percentage of CU students with green eyes within 0.1% at 95% confidence?

Your answer: _____

- (2) (1 point) Is it feasible to obtain a sample of this size from CU students?

Your answer: _____

- (3) Suppose you are going to be testing a hypothesis percentage of people with green eyes and the null hypothesis is that $p = 0.02$. If your random sample of size $n = 200$ found 6 people with green eyes, is this an appropriate sample to use for a hypothesis test?

- (a) (1 point) Yes or no?

Your answer: _____

- (b) (1 point) Explain.

Your answer: _____

- (4) If your random sample of size $n = 300$ found 6 people with green eyes, is this an appropriate sample to use for a hypothesis test?

- (a) (0 points) Yes or no?

Your answer: Yes.

- (b) (1 point) Explain.

Your answer: _____

- (5) (2 points) If the alternate hypothesis is that more than 2% of the population has green eyes, what conclusion would you make at the 5% significance level based on the second sample (from question 4)?

Your answer: _____

- (6) (2 points) If you perform 20 independent hypotheses tests, each at the 5% level of significance,¹ what is the probability at least one of them rejects the null hypothesis?

Your answer: _____

¹Hint: What does the level of significance α mean in hypothesis testing? What is "Type I error"?

Additional Questions

- (7) (6 points possible) What are *mathematical expressions* for the respective margin of errors

$$E = z^* \times SE \quad \text{or} \quad E = t^* \times SE$$

in the third column of the following table?

With a c -level of confidence, I want to estimate...	calculator function...	In this case, the margin of error E is...
A population mean μ with known population standard deviation σ	ZInterval	
A population mean μ with unknown population standard deviation	TInterval	
A population proportion p	1-PropZInt	
A difference of population means $\mu_1 - \mu_2$ with unknown population standard deviation σ	2-SampZInt	
A difference of population means $\mu_1 - \mu_2$ with known population standard deviation σ	2-SampTInt	
A difference of population proportions $p_1 - p_2$	2-PropZInt	

- (8) (4 points possible) Which is higher? In each part below, there is a value of interest and two scenarios (I and II). For each part, report if the value of interest is larger under scenario I, scenario II, or whether the value is equal under the scenarios.

- (a) The standard error of \hat{p} when (I) $n = 125$ or (II) $n = 500$.

I or II?

- (b) The margin of error of a confidence interval when the confidence level is (I) 90% or (II) 80%.

I or II?

- (c) The p-value for a Z-statistic of 2.5 calculated based on (I) a sample with $n = 500$, or on (II) a sample with $n = 1000$.

I or II?

- (d) The probability of making a Type 2 Error when the alternative hypothesis is true and the significance level is (I) 0.05 or (II) 0.10.

I or II?