

Question 1

$$\begin{aligned}\text{mean} &= 63.3 \\ \text{median} &= 66 \\ \text{sd} &= \sqrt{\frac{4.1^2 + 4.1^2 + 9.3^2 + 12^2 + 2.7^2}{5 - 1}} = \sqrt{271.4/4} \approx 8.237\end{aligned}$$

Mean

- (okay to not show work here)
- -1 if answer is incorrect but approach was correct
- -2 if answer is incorrect and formula is incorrect
- -3 if answer is incorrect and showed no work

Median

- (okay to not show work here)
- -1 if answer is incorrect but approach was correct
- -2 if answer is incorrect and formula is incorrect
- -3 if answer is incorrect and showed no work

SD

- -1 if answer is correct but showed no work
- -1 if answer is incorrect because:
 - calculation error
 - forgetting to take square root
 - wrong n
 - forgot to square each
- -2 if answer is incorrect because:
 - wrong formula
 - forgetting to include a sample value
 - using incorrect mean
- -4 if answer is incorrect and showed no work

Question 2

$$H_0 : \mu_0 \geq 625 \text{ or } = 625$$

$$H_A : \mu < 625$$

$$z = \frac{600 - 625}{70/\sqrt{(49)}} = -2.5$$

$$p = .0062 \text{ (left tail, not times 2)}$$

$$.0062 < .01 \text{ Reject the null, } p < \alpha$$

$$\text{critical value} = \text{something in } [-2.302, -2.303]$$

$$-2.5 < -2.303 \text{ Reject the null, "extreme" test statistic, in rejection region}$$

- Hypotheses
 - 2 if no statement of null and alternative hypotheses
 - 1 if incorrect statement of null and alternative hypotheses (most likely two sided test)
- Test statistic
 - 1 if wrong test statistic (most likely because incorrect SE (e.g., not SD/\sqrt{n}))
- P-value or critical value
 - 1 if used 2 sided test
- Table
 - 1 if used t-table instead of standard normal
 - 1 if looked in the wrong tail
 - 2 if I have no idea where the p-value came from
- Conclusion
 - 1 if conclusion to reject/not reject the null is wrong, given their work (e.g., no points off if correct conclusion, but used 2 sided test)
 - 1 if no conclusion drawn at all (doesn't mention reject or not reject the null)
- Note: 2 cushion points

Question 3

Part A

Overall: -2 if didn't relate any to each other; -1 if tried, but wrongly or incompletely related them to each other.

Sample distribution

Basic answer: distribution of single sample of data points (e.g., sample of women's ages)

- -2 if didn't define at all
- -1 if defined wrong (e.g., mixed it up with another definition)

Sampling distribution

Basic answer: distribution of sample statistics; theoretical distribution of statistic result if we took many repeated samples (e.g., took many samples of women and took the mean age of each)

- -2 if didn't define at all
- -1 if defined wrong (e.g., mixed it up with another definition, didn't mention its a distribution of a statistic)

Population distribution

Basic answer: distribution of *all possible* data points (e.g., every single woman in the world's age)

- -2 if didn't define at all
- -1 if defined wrong (e.g., mixed it up with another definition)

Part B

Why Anne is wrong

Basic answer: We don't know the exactly probability (Anne said 95%) that true parameter falls within our particular calculation of the C.I.

- -1 if didn't acknowledge Anne is wrong at all or gave completely wrong reason
- -.5 if gave slightly wrong reason Ann is wrong

What is a confidence interval

Basic answer: How well a sample statistic estimates the underlying population value is always an concern. A C.I. is an interval around a point estimate, within which the parameter value is likely to fall. Could give a formula.

- -1 if didn't define at all or completely wrong definition
- -.5 if defined slightly wrong

Correct interpretation

Basic answer: If we took many, many samples and calculated their 95% confidence interval, 95% of the time the true population param would fall within *those confidence intervals* (note: plural!).

- -2 if didn't give an interpretation at all
- -.5 if partially wrong/incomplete (I anticipate many will say it falls within a specific C.I. 95% of time)

Question 4

- -2 if formula for standard error is wrong
- -2 if wrong z-score is used
- -2 if formula for CI is wrong
- -1 if simple calculation mistake
- -2 if formula/answer for the margin of error is wrong

Question 5

The basic rule is that not mentioning a part with a single underline is -0.5. The definitions come from the course book.

Central limit theorem

When the sample sizes are sufficiently large, the resulting sampling distribution will be normally distributed.

- -0.5 if no mention about large sample sizes
- -0.5 if no mention about sampling distribution
- -0.5 if no mention about normal distribution

p-value

The probability of observing a sample statistic in a hypothesis testing under the assumption that the null hypothesis is true.

- -0.5 if no mention about the probability of getting a sample statistics
- -0.5 if no mention about the context of a hypothesis testing
- -0.5 if no mention about the assumption that the null is true

Standard error

A measure of how far a sample mean or proportion tends to be from the true population mean or proportion.

- -0.5 if no mention about sample mean
- -0.5 if no mention about “tends to be” (as opposed to “is”)
- -0.5 if no mention about population mean
- -0.5 so long as there is no mention about the relationship between sample mean and population mean

Type II error

The alternative hypothesis is true, but instead you falsely fail to reject the null.

- -0.5 if no mention about “fail to reject the null”
- -0.5 if “fail to reject the null” only (no mention about “alternative hypothesis is true”)
- -2 if confused with Type I error

Question 6

- -2 if only one type is identified
- -2 if not understanding the meaning of measurement error
- -1 if justification does not make sense (for each)