IT3030 Biostatistics Exam #2 (2022.05.17)

This is an online and open-book test. You are allowed to look for any studying materials around you, except discussing with other people. Test time is 60-min (11 am to 12 pm). You only have ONE chance to submit your answers.

* 必答

* 此表單將記錄您的名稱，請填入您的名稱。

1. What is the random variable used in describing the sampling distribution of means of samples of size n? *

   (4 點)

   - [x] Mean value from these n observations
   - [ ] Mean value for general population
   - [ ] Standard deviation of these n observations
   - [ ] The sample size n

2. In Week #9 slides, page 19, we used an example of n = 2 from a population of 3 observations to illustrate the difference between population statistics and sample statistics. Which of the followings has the same value between population and sample? *

(3 點)

- ○ Median
- ✓ Mean
- ○ Range
- ○ Standard deviation

3. Given the standard deviation of cholesterol level of all US males as X1. Let's randomly select many n=10 samples from them, and compute the standard deviation of these sampling means as X2. Which is the followings is correct? *

(3 點)

- ○ X1=X2
- ○ X1 < X2
- ○ Cannot determine which is larger.
- ✓ X1 > X2

4. A MATLAB function hist(X, n) is used to plot the frequency histogram of some samples. Which of the followings is correct? *

(3 點)

- [x] n is the number of bins to keep these data.
- [ ] n is an required parameter to call this function.
- [ ] X is the mean value of these samples.
- [ ] n is the sample size

5. Which of the following statements is true regarding the Central Limit Theorem? *

(3 點)

- [x] The mean of sampling distribution of sample means is the same as the population mean.
- [ ] The variance of sampling distribution of sample means is the same as the population variance.
- [ ] The standard deviation of sampling distribution of sample means is the same as the population standard deviation.
- [ ] When the sample size n is large, the sampling distribution of the sample means is approximately skewed to the right.

6. Assuming that mean value is 122 and standard deviation is 26 for the entire population regarding their blood pressure. Which of the followings best describes the standard deviation of the sampling distribution of the means of sample size 100?
*

(3 點)

- ○ 26
- ○ 260
- ✓ 2.6
- ○ 0.26

7. Which of the followings can help to reduce the standard error of the means (SEM) in selecting n samples to represent the entire population? *

(3 點)

- ✓ Increase the sample size
- ○ Decrease the sample size
- ○ Increase the population standard deviation
- ○ None of the other choices is true

8. Considering the standard normal distribution. Which of the followings best describe the probability from z=-inf (minus infinitive) to z=1.56? (Hint: Week #10, slide #9) *

(3 點)

- ◯ 0.7324
- ◯ 0.9750
- ✓ 0.9406
- ◯ 0.9986

9. A confidence interval is narrower if: *

(3 點)

- ◯ the sample mean is larger
- ✓ the sample size is larger
- ◯ the sample size is smaller
- ◯ the sample standard deviation is larger

10. Which of the followings DID NOT describe a t-distribution? *

(3 點)

- ✓ It is a normal distribution
- ◯ It is a family of distribution rather than a single one
- ◯ It requires an additional parameter called degree of freedom
- ◯ It is used when we cannot get enough sample size

11. A MATLAB function NORMPDF(X1, X2, X3) is used to describe a normal distribution. Which of the followings is correct in describing its usage? *

(3 點)

- ◯ X1 is the mean value
- ◯ X2 is the standard deviation
- ◯ X1 is the sample size
- ✓ X2 and X3 are optional when using this function.

12. Which is the best answer for the output of normcdf(1)? *

(3 點)

- ◯ 0.1587
- ◯ 0.5
- ◯ 0
- ✓ 0.8413

13. What would be the answer for normcdf(0)? *

(3 點)

- ◯ 0.25
- ◯ 0.75
- ◯ 1.00
- ✓ 0.5

14. Which of the followings is most close to the output from NORMINV(0.95) *

(3 點)

- ◯ -1.96
- ✓ 1.65
- ◯ -1.65
- ◯ 1.96

15. Which of the following MATLAB results is correct? *

(3 點)

- ◯ tinv(inf, 0.95) = 1.6449
- ✓ tinv(0.95,inf) = 1.6449
- ◯ tinv(inf, 0.05) = 1.6449
- ◯ tinv(0.95) = 1.6449

16. Which is correct when describing a p-value in hypothesis testing? *

(3 點)

- ◯ This is the same as the significant level of the test.
- ◯ p-value cannot be larger than the prescribed significant test level 0.05.
- ✓ p-value could be as small as 0.00001
- ◯ p-value could be greater than 1

17. Which is MOST correct to reject a null hypothesis, given a prescribed significant level alpha and computed p-value: *

(3 點)

- ◯ Alpha > p-value
- ◯ Alpha >= p-value
- ◯ Alpha < p-value
- ◯ Alpha <= p-value

18. In hypothesis testing, a type I error is: *

(3 點)

- ◯ acceptance error
- ◯ beta error
- ◯ false positive
- ◯ false negative

19. The power of a test is: *

(3 點)

- ◯ type I error
- ◯ type II error
- ◯ 1-(type I error)
- ◯ 1-(type II error)

20. How would the width of a 95% CI compare with the width of a 90% CI based on the same sample? *

(3 點)

- ◯ Same
- ✓ 90% CI is wider
- ◯ 95% CI is wider
- ◯ Cannot decide

21. One reason for using a t distribution instead of normal dist. for calculating CI for means is:
*

(3 點)

- ◯ z can only be used for large samples
- ◯ the 10% condition may not be satisfied
- ✓ s is used to estimate σ
- ◯ z gives a larger margin of error than t

22. As the confidence level increases, the confidence interval _____ ? *

(3 點)

- ◯ narrows
- ✓ widens
- ◯ doesn't change
- ◯ decreases

23. How can you get a smaller standard error of the mean? *

(3 點)

- ◯ Decrease the confidence level
- ◯ Increase the sample size
- ☑ Either decrease the confidence level or increase sample size
- ◯ you cannot make your margin of error smaller

24. What 3 conditions must be met before calculating a confidence interval? *

(3 點)

- ◯ Positive, Normal, Dependent
- ◯ Fixed sample size, Constant success rate, Independent
- ◯ Skewed, Dependent, Biased
- ☑ Random, Normal, Independent

25. If we were to build 10,000 different 90% confidence intervals: *

(3 點)

- ◯ Approximately 100 of them would not include the unknown μ
- ◯ Approximately 90 of them would include the unknown μ
- ☑ Approximately 1,000 of them would not include the unknown μ
- ◯ Approximately 900 of them would include the unknown μ

26. A 95% C.I. for the mean is found as [11.8 , 15.2]. Hence, we are 95% confident that: *

(3 點)

- ◯ The sample mean is between 11.8 and15.2
- ◯ 95% of the population is between 11.8and 15.2
- ✓ The population mean is between 11.8 and 15.2
- ◯ The population is between 11.8 and15.2

27. CI is given of 32<m<40 ... find x-bar (mean value from the sample) *

(3 點)

- ◯ 32
- ◯ 52
- ✓ 36
- ◯ 40

28. The maximum probability of committing a type I error is called the ..... *

(3 點)

- ✓ level of significance
- ◯ rejection region
- ◯ null hypothesis
- ◯ critical region

29. If the sample size is more than 30 and σ is known, the correct statistical test to use... *

(3 點)

- ◯ t-test
- ✓ z-test
- ◯ any test
- ◯ P-value

30. If the P-value is greater than α, the decision is to *

(3 點)

- ◯ reject the null
- ◯ find a different test
- ✓ fail to reject the null
- ◯ use a two-tailed test

31. The power of the test represents probability of _____. *

(3 點)

- ◯ correctly failing to reject the null, when it is true
- ◯ incorrectly rejecting the null, when it is actually true
- ◯ incorrectly failing to reject the null, when it is false
- ✓ correctly rejecting the null, when it is indeed false

32. Null hypothesis: car brakes were installed correctly; Alternative hypothesis: installed incorrectly. What is a type I error?
*

(3 點)

- ◯ Decide: brakes work; Reality: brakes work
- ◯ Decide: brakes work; Reality: brakes fail
- ◯ Decide: brakes fail; Reality: brakes fail
- ☑ Decide: brakes fail; Reality: brakes work

33. A hypothesis is "two-tailed" if the alternative hypothesis contains a _____ sign. *

(3 點)

- ◯ <
- ◯ =
- ◯ >
- ☑ ≠