

BMCC MAT150.722 Final Exam

You will be given all class to complete this test. In the event these instructions conflict with what I say in class, what I say takes precedence. You are allowed to have one sheet of notes. Each problem is worth 10 points. Good luck!

1 Central Limit Theorem

Indicate whether the following pieces of information are required to apply the central limit theorem. On your answer sheet write T if can and F otherwise.

- (1.1) A known population mean μ .
- (1.2) The sample size must be at least 20.
- (1.3) The probability of success p must be constant.
- (1.4) The original population must be uniformly distributed.
- (1.5) A known population standard deviation σ .
- (1.6) The original population size is at least 100.
- (1.7) The original population variance is at most 1.
- (1.8) The sample size is at least 30 or the original population is normally distributed.
- (1.9) The original population is symmetrically distributed.
- (1.10) The original population is asymmetrically distributed.

2 Central Limit Theorem

2.1 What value for $\mu_{\bar{x}}$ does the Central Limit Theorem give?

- (A) μ
- (B) $\frac{\mu}{\sqrt{n}}$
- (C) σ
- (D) $\frac{\sigma}{\sqrt{n}}$
- (E) None of these

2.2 What value for $\sigma_{\bar{x}}$ does the Central Limit Theorem give?

- (A) μ
- (B) $\frac{\mu}{\sqrt{n}}$
- (C) σ
- (D) $\frac{\sigma}{\sqrt{n}}$
- (E) None of these

2.3 What does the Central Limit Theorem tell you about the original distribution?

- (A) Nothing
- (B) It is normally distributed.
- (C) It is uniformly distributed.
- (D) It is symmetric.
- (E) None of these

2.4 What does the Central Limit Theorem tell you about the distribution of \bar{x} ?

- (A) Nothing
- (B) It is normally distributed.
- (C) It is uniformly distributed.
- (D) It is symmetric.
- (E) None of these

2.5 If $n = 20$ when can you use the Central Limit Theorem?

- (A) Never
- (B) When the original population is normally distributed.
- (C) When the original population is uniformly distributed.
- (D) When the original population is asymmetrically distributed.
- (E) None of these

3 Normal Distribution

3.1 Calculate the area under the curve of a normal distribution between the z-scores of 1.64 and 1.96

- (A) .0255
- (B) .055
- (C) .255
- (D) .55
- (E) None of these

3.2 What z -score corresponds to an area of .8888?

- (A) .8106
- (B) 1.22
- (C) 1.645
- (D) 1.96
- (E) None of these

4 Hypothesis Test

4.1 What is the relationship of confidence and significance in a hypothesis test?

- (A) Confidence = $1 - \text{Significance}$
- (B) Confidence = $1 + \text{Significance}$
- (C) Confidence = $2 \times \text{Significance}$
- (D) Significance = $2 \times \text{Confidence}$
- (E) None of these

4.2 A critical value is a specific type of

- (A) mean
- (B) z -score
- (C) distribution
- (D) significance level
- (E) None of these

Use the following scenario for the next three questions.

Popeye is buying a large number of cans of spinach from Bluto. Popeye prefers a particular kind of canned spinach which has 10 ounces of spinach per can. When Popeye eats spinach, he gains incredible strength, but for full effect he requires at least 9.5 ounces of spinach. Further, his mouth is only so large and Popeye is not a wasteful man, hence his preference for this particular brand. Popeye's sweetheart is Olive Oyl, something of a coy flapper whose extremely thin build lends itself well to the fashions of the Roaring Twenties.¹ Bluto is enamored with Olive, and this has caused tension between Bluto and Popeye in the past. Therefore Popeye wants to be sure that he's getting the right amount of spinach in his cans. As a rough test, Popeye selects 36 cans at random and measures the spinach in each. He finds the average amount of spinach is 10.21 ounces and decides to use the sample standard deviation of .6 ounces as an estimate for the population standard deviation. He then performs a hypothesis test.

5 Hypothesis Test

5.1 Identify the null hypothesis.

- (A) $\mu = 10$
- (B) $\mu = 10.6$
- (C) $\mu \neq 10$
- (D) $\mu > 10$
- (E) None of these

¹http://en.wikipedia.org/wiki/Olive_Oyl

5.2 Identify the alternate hypothesis.

- (A) $\mu = 10$
- (B) $\mu = 10.6$
- (C) $\mu \neq 10$
- (D) $\mu > 10$
- (E) None of these

6 Hypothesis Test

6.1 What is the critical value for a 95% symmetric hypothesis test?.

- (A) .8106
- (B) 1.22
- (C) 1.645
- (D) 1.96
- (E) None of these

6.2 What is the critical value for a 99% symmetric hypothesis test?.

- (A) .8106
- (B) 1.22
- (C) 1.645
- (D) 1.96
- (E) None of these

7 Hypothesis Test

7.1 Calculate the test statistic.

(A) $z = \frac{10.21-10}{\frac{.6}{36}} = 12.6$

(B) $z = \frac{10.21-10}{\frac{.6}{\sqrt{36}}} = 2.1$

(C) $z = \frac{10.21-10}{.6} = .35$

(D) $z = \frac{10.21-10}{36} = .006$

(E) None of these

7.2 Given this information, what do you do with the null hypothesis at 99% confidence?.

(A) Accept the null hypothesis.

(B) Reject the null hypothesis.

(C) Fail to reject the null hypothesis.

(D) Modify the null hypothesis.

(E) None of these

- 8 If your test statistic falls outside of your rejection region, what is the conclusion of your hypothesis test?
- 9 Give a definition of the notation $\mu_{\bar{x}}$ in words. the mean of the sampling distribution of the sample mean
- 10 Draw and label symmetric rejection region you might use for a hypothesis test. Label the following: critical value, rejection region, mean, test statistic.

Answer Sheet

1.1 _____ 1.2 _____ 1.3 _____ 1.4 _____ 1.5 _____
1.6 _____ 1.7 _____ 1.8 _____ 1.9 _____ 1.10 _____
2.1 _____ 2.2 _____ 2.3 _____ 2.4 _____ 2.5 _____
3.1 _____ 3.2 _____ 4.1 _____ 4.2 _____
5.1 _____ 5.2 _____ 6.1 _____ 6.2 _____
7.1 _____ 7.2 _____

8 _____

9 _____

10

