# Notes #4 – Questions

1. We want to estimate the probability of randomly selecting a student with a GPA that is greater than 3.2. Which do we NOT need to know:

a. The shape of the population
b. The number of students in the population
c. The mean of the population
d. The standard deviation of the population

2. Assume that GPAs are normally distributed with a mean of 2.8 and a standard deviation of 0.2. What is the z-score for a student with a 3.2 GPA?

a. 0.4
b. 1
c. 2
d. -1
e. 0.875

3. For a z-score of 2.0, what technique/rule would we use to estimate the probability of getting that score or higher?

a. frequency table
b. z-table
c. 68-95-99
d. the formula to calculate p

4. What is the probability of randomly selecting a student with a GPA of 3.2 or greater (a z-score of 2.0 or greater)?

a. roughly 0%
b. roughly 2.5%
c. roughly 20%
d. roughly 95%

5. I'm going to ask you to stand up front and blindly select a group of students with an average GPA of 3.9

The closer you are, the more I'll pay you.

You can select the group size. Which size would you prefer?

a. N = 2
b. N = 10
c. N = 50
d. N = 100

6. How will the average GPAs of groups of students compare to the GPAs of individual students?

Extreme GPAs will occur…

(E.g. extreme means greater than 3.7 or less than 1.2)

a. more often for groups means than individuals
b. equally probable for group as for individuals
c. less often for group means than individuals

DSM

7. You want to create a Distribution of Sample Means (DSM) for GPAs in this class. Your sample size is 10. Which would you do?

a. Select 10 students, one at a time, and create a distribution of their GPAs.
b. Select 10 students and calculate their average GPA.
c. Select 10 students and calculate their average GPA. Then select another 10 students and calculate average. Repeat this 1000 times.

DSM

8. You've finished collecting a DSM of GPAs for a sample size of 10. What can you predict with this DSM?

a. the chance of a student having a GPA over 2.3
b. every GPA within a group of 10 students
c. the chance of a group of 10 students having a mean GPA of 3.4

SEM

9. For a population of young adults, average time to exhaustion on a treadmill is 52 minutes with a standard deviation of 12 minutes. What is the standard error for a sample size of 16?

a. 0.75 minutes
b. 3 minutes
c. 12 minutes
d. 52 minutes
e. 64 minutes

(Assume the population is normal)

SEM

10. (continued) Minutes to exhaustion: $\mu = 52$, $\sigma = 12$. Assume n = 16.

In what range would you expect 68% of sample means to fall?

a. 52 +/- 1 minutes
b. 52 +/- 3 minutes
c. 52 +/- 12 minutes
d. 52 +/- 16 minutes
e. 52 +/- 34 minutes

SEM

11. (continued) Minutes to exhaustion: $\mu = 52$, $\sigma = 12$. Assume n = 16.

In what range would you expect 68% of individuals to fall?

a. 52 +/- 1 minutes
b. 52 +/- 3 minutes
c. 52 +/- 12 minutes
d. 52 +/- 16 minutes
e. 52 +/- 34 minutes

Central Limit Theorem

12. If you take a normal distribution and drag a small portion of the highest scores towards VERY large values…

What happens to the mean?

a. increases
b. remains the same
c. decreases

Central Limit Theorem

13. If you take a normal distribution and drag a small portion of the highest scores towards VERY large values…

What happens to the median?

a. Increases
b. Remains the same
c. Decreases

Central Limit Theorem

14. If you take a normal distribution and drag a small portion of the highest scores towards VERY large values…

What happens to the standard deviation?

a. increases
b. remains the same
c. decreases

## SD Revisited

15. Which is the correct formula for calculating standard deviation from a sample?

a. $\overline{X} = \frac{\sum X_i}{n}$

b. $\sigma = \sqrt{\frac{\sum_i (x_i - \mu)^2}{N}}$

c. $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$

d. $z = \frac{x - \mu}{\sigma}$

e. $SE_{\bar{x}} = \frac{s}{\sqrt{n}}$

Example Hypothesis Test: Kaplan/IQ

16. $\mu = 100$, $\sigma = 15$, $n = 50$

What is the $\sigma_M$ (standard error of the mean, SEM):

a. $100 / 50 = 2$
b. $50 / \sqrt{15} = 12.9$
c. $15 / 50 = 0.3$
d. $15 / \sqrt{50} = 2.12$
e. $15 / 100 = 0.15$

Example Hypothesis Test: Kaplan/IQ

17. $\mu = 100$, $\sigma = 15$, $n = 50$, $\sigma_M = 2.12$

What is the sample mean that corresponds to Z* ("Z critical") = 1.65:

a. 100 + 1.65
b. 100 + (2.12)(1.65)
c. 100 + (2.12)(15)
d. 100 + (2.12)(50)
e. 100 + (15)(50)

## Hypothesis Testing

18. Our “alpha” value is how much…

a. chance we are willing to accept
b. variability is in the data
c. probability there is of getting our data/result
d. the treatment affected the mean

## Hypothesis Testing

19. How do we specify the value for “alpha”?

(multiple answers are correct, choose one)

a. from the z-table
b. we select it based on our needs
c. from a formula
d. it is based on the population
e. it is set by convention

## Hypothesis Testing

20. What is the decision rule?

a. A sentence describing the effect
b. A critical value that our data must "beat"
c. A variable that describes variability
d. The probability of getting our data

## Hypothesis Testing

21. What is the test statistic?

a. An amount of chance
b. A value calculated from our data
c. A rule for determining which statistical test to use

Hypothesis Testing

22. How do we make our final decision?

By seeing if…

a. our alpha is small enough
b. the sample mean is large enough
c. the standard deviation is correct
d. the test statistic beat the decision rule
e. n is large enough

**Chance**

23. For every annual physical, a nurses checks my height using a yardstick. My height hasn't changed, but every year the number is a bit higher or lower.

The difference is likely:

a. sampling error
b. measurement error
c. uncontrolled factors
d. a real effect

**Chance**

24. UCSD's mean GPA is 3.05. A psych grad student blindly recruits subjects for a tutoring program. The mean GPA for her students is 3.15 before the program and 3.17 after the program.

The difference (3.17 – 3.05) is likely:

a. sampling error
b. measurement error
c. uncontrolled factors
d. a real effect

# Chance


25. A study shows that oscillococcinum relieves flu relative to bed rest. The difference is likely:

a. sampling error

b. measurement error

c. uncontrolled factors

d. a real effect

**Outcome Factors**

26. If you increase the effect size, which part of the hypothesis are you most directly affecting?

a. z* (critical z-value)
b. the standard error of the mean
c. the test statistic

**Outcome Factors**

27. If you decrease the population/sample variability, which part of the hypothesis are you most directly affecting?

a. z* (critical z-value)
b. the standard error of the mean
c. the test statistic

**Outcome Factors**

28. If you decrease the sample size, which part of the hypothesis are you most directly affecting?

a. z* (critical z-value)
b. the standard error of the mean
c. the test statistic

**Outcome Factors**

29. If you increase alpha, which part of the hypothesis are you most directly affecting?

a. z* (critical z-value)
b. the standard error of the mean
c. the test statistic

**Outcome Factors**

30. A psych grad student is studying peer-induced aggravation and wants to improve her ability to detect an effect. Which should she not do? (multiple apply, choose one)

a. increase the experiment duration
b. recruit from a wider spectrum of "emotional intelligence"
c. recruit more students
d. switch alpha from 5% to 10%