Dr. Segal **Psychological Statistics** Fall 2001

Exam 2 + KEY

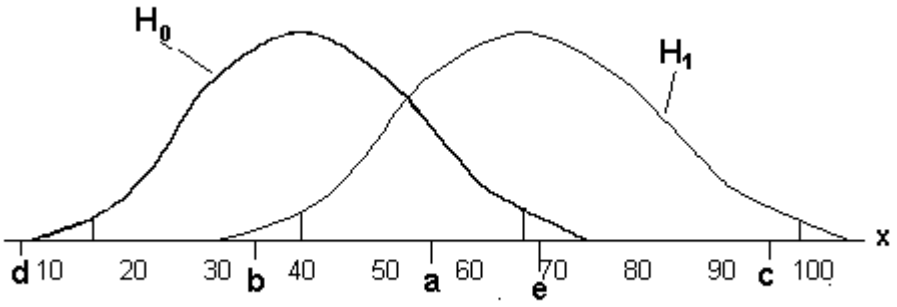
*****A survey research team was asked to compare a new formula for a popular soft drink against the old one. They did so by asking a random sample of 600 people in a blind taste test which of two soft drinks, the new one or the original, they preferred. They found that 336 people or 56% preferred the new drink. (4 questions)

1. The **null hypothesis** to be tested is: A) exactly 50% of the sample prefers the new soft drink; B) exactly 56% of the sample prefers the new soft drink; C) exactly 50% of the population prefers the new soft drink; D) more than 50% of the sample prefer the new soft drink; E) 56% population prefers the new drink.
2. We evaluate this hypothesis using a sampling distribution of proportions. The standard error of the tested sampling distribution is: A) 0.052; B) 25.4; C) 0.0204; D) 0.362; E) 36.2
3. The z-score obtained in the analysis is: A) .65; B) 1.87; C) 2.45; D) 2.94; E) 3.51
4. At the .05 level of significance you can conclude: A) the new soft drink is preferred to the old one; B) the old soft drink is preferred to the new one; C) the preferences in the sample are too similar to identify a population preference; D) the null hypothesis is correct.

5. If two events A and B are **Independent**, and P(A) =.4 and P(B) = .4, What is the probability of A in a single trial under the condition that B has occurred, i.e. P(A|B)?
   A) .4; B) .8; C) .16; D) 0; E) .64.
6. If two events A and B are **Mutually Exclusive**, and P(A) =.4 and P(B) = .4, What is the probability of A in a single trial under the condition that B has occurred, i.e. P(A|B)?
   A) .4; B) .8; C) .16; D) 0; E) .64.
7. If two events A and B are **Independent**, and P(A) =.4 and P(B) = .4, What is the probability of A and B both occurring in a single trial, i.e., P(A and B)?
   A) .4; B) .8; C) .16; D) 0; E) .64.
8. If two events A and B are **Independent**, and P(A) =.4 and P(B) = .4, What is the probability of either A or B occurring in a single trial, i.e., P(A or B)?
   A) .4; B) .8; C) .16; D) 0; E) .64.
9. If someone draws 50 random samples of size 25 from a population and computes a standard deviation using the means of those samples, the resulting statistic is an estimate of: A) the standard deviation of the population; B) the standard deviation of the sampling distribution of means; C) the expected value of the standard deviation; D) the standard error of the standard deviation.
10. If the null hypothesis is in fact **false**, the probability of making a Type I error is:
    A) α; B) β; C) between 0 and α; D) 0; E) .between 0 and β.
11. If the null hypothesis is in fact **true**, the probability of making a Type I error is:
    A) α; B) β; C) between 0 and α; D) 0; E) .between 0 and β.
12. If everything else is the same, under which condition would a researcher be more likely to make a **Type 1** error? A) α = .05, N= 20; B) α = .05, N= 50; C) α = .01, N= 20; D) α = .01, N= 50; E) A and B would be equally likely.
13. If everything else is the same, under which condition would a researcher be more likely to make a **Type 1I** error? A) α = .05, N= 20; B) α = .05, N= 50; C) α = .01, N= 20; D) α = .01, N= 50; E) A and C would be equally likely.

14. If Dr Chu, who is a good researcher, uses an α level of .05 in 200 different independent statistical tests, about how often would you expect her to make a Type I error? A) 10 times; B) 5 times; C) 20 times; D) somewhat less than 10 times; E) somewhat more than 10 times.

*****The following sketch represents sampling distributions of means, an H_0 distribution and a possible H_1 distribution. The distributions are normal. The vertical lines mark the critical values where a total of 5% of the area falls in the two tails on each of the two curves. Alpha in this analysis is .05, two-tailed. (6 questions).



15. If we designed an experiment in which H_0 is actually true which is the most likely value of the mean of a random sample? A) a, B) b, C) c, D) d, E) e
16. If we designed an experiment in which H_1 is actually true which is the most likely value of the mean of a random sample? A) a, B) b, C) c, D) d, E) e
17. If we ran an experiment and the mean of the sample was **a**, What conclusion would be drawn. A) Accept H_0 ; B) accept H_1; C) Reject Ho; D) Accept both H_0 and H_1.
18. If we ran an experiment and the mean of the sample was **e**, What conclusion would be drawn. A) Accept H_0; B) accept H_1; C) Reject Ho; D) Accept both H_0 and H_1.
19. By viewing this sketch approximately what is the power of the statistical test if H_1 were true? A) .05; B) .95; C) .25; D) .50; E) .75.
20. If α were changed from .05 to .01, and everything else remained the same, which value of a sample mean is most likely to be interpreted differently? A) a; B) b; C) c; D) both b and e; E) e.

21. Consider sampling distributions of the mean. As sample size goes up: A) the variability of their means also goes up. B) the shape of the sampling distributions more and more closely approximates the shape of the population. C) The range of possible values of the means goes down. D) the number of possible samples increases linearly with sample size. E) None of the above.
22. How many different combinations of six people can you select from a group of 15? A) 720; B) 5005; C) 1.86 million; D) 53130; E) 2.5.
23. How many different permutations of four officers can you get from a club with sixty members? A) over 11 million; B) 488 thousand; C) 24; D) 15; E) 4520.

*****At the .05 level, two-tailed test evaluate whether a class of 25 students, with the following set of data: $\sum X = 1775$, $\sum X^2 = 128425$, $\frac{(\sum X)^2}{N} = 126025$ scored significantly below a population mean of 76. (5 questions)

24. What is the standard deviation of the sample?
A) 10.0; B) 6.54; C) 22.28; D) 6.71; E) 8.23

25. What is the standard error of the sampling distribution?
A) 4.12; B) 6.56; C) 2.0; D) 3.12; E) 4.78.

26. What is the t-value of this analysis? A) -2.16; B) -1.13; C) -4.75; D) -3.32; E) -2.50

27. What value of t is needed to reach significance?
A) -1.711; B) -1.96; C) -1.645; D) -2.064; E) -2.042

28. What conclusion can you draw from this analysis: A) Accept H_0 and conclude that the class performed about as well as the population as a group; B) Reject H_0 and conclude that the class performed significantly worse than the population as a whole. C) Reject H_0 but conclude that there is not enough information to decide whether the class performed significantly worse than the population as a whole.

***** Thirty randomly selected students were given a new experimental reading course. At the end of the year they took a standardized reading test with a mean, $\mu = 75$. The students mean on the test, $\bar{X} = 79$, with s = 9.5. Evaluate these data to see if these students performance was significantly above average. You are called in to evaluate this difference using a one sample t-test with $\alpha = .05$, two tailed. (Four questions)

29. The standard error used to evaluate whether the experimental students performed significantly different from the standardized group is: A) 9.5; B) 1.552; C) 11.14; D) 1.734; E) 3.23

30. The t-test for evaluating whether the subjects averaged significantly better than the standardized group showed a result of : A) 1.631; B) 2.306; C) .961; D) 2.449

31. The t- value needed for significance, $\alpha = .05$, two-tail is: A) 2.042; B) 2.048; C) 1.96; D) 2.131; E) 2.045.

32. From these data you will: A) accept H_0 and conclude that the differences were probably due to chance; B) accept H_0 because the differences were not large enough to be interesting; C) reject H_0 and conclude that the experimental group performed significantly better than the controls. D) decide that no conclusion can be drawn.

33. A random sample of 1500 of 1,500,000 students was given an American history test. The sample mean and standard deviation were 75 and 9.2, respectively. From these data you can be 99% sure that the population mean was between what two values?
A) 74.39-75.61. B) 68.54-77.85; C) 65.8-84.2; D) 70.1-79.9; E) 62.6-84.2.

KEY: CCDAA DCEBD AECDB EACDE EBAAC EDBDB ECA