PSYC8101: Midterm Exam Corrections

Eddie Chapman

11/18/2019

#3 *(0 of 2 points)*
Assuming grades are curved such that your grade is determined by your location relative to your class-mates, if you score above average on a midterm exam, you're more likely to get a higer letter grade if that standard deviation is

a. Small
b. Large
c. **It does not matter what the standard deviation is**
d. ~~Cannot be determined from the information given~~

#6 *(0 of 2 points)*
When testing a hypothesis about the mean of one population, the only way to avoid sampling error is to

a. ~~Use the standard error of the mean~~
b. Use a random sample
c. Draw a large number of samples
d. **Measure the entire population**

#7 *(0 of 2 points)*
Why do researchers usually **not** use $\alpha = .10$ as the level of significance?

a. **It would make a Type I error too likely**
b. ~~It would make a Type II error too likely~~
c. It would make both a Type I and a Type II error too likely
d. None of the above

#11 *(0 of 2 points)*
When estimating the standard error of the difference between means of two independent samples, the pooled variance

a. Gives greater weight to the larger of the two samples
b. Gives greater weight to the smaller of the two samples
c. ~~Gets smaller as the sample size gets larger~~
d. **None of the above**

#17 *(0 of 2 points)*
If the null hypothesis for a one-way ANOVA is true, $MS_{between}$ is expected to be approximately equal to

a. **0**
b. ~~1~~
c. MS_{within}
d. F

#19 *(0 of 2 points)*
Compared to Fisher's protected t-tests, Tukey's HSD test

a. Leads to a higher rate of Type I errors
b. ~~Leads to a lower rate of Type II errors~~
c. Maintains less control over experimentwise alpha
d. **Is more conservative**

#20 *(0 of 2 points)*
We can think of mean squares as

a. F-ratios
b. Central tendency
c. ~~Standard devisations~~
d. **Variances**

#31 b. *(2 of 4 points)*
How does the p-value relate to the comparison of the test statistic with the critical value when we cary out hypothesis testing by hand? You may draw a picture if it is helpful.

The critical value represents the region of a distribution that we consider unlikely enough to reject the null hypothesis. The p-value represents the likelyhood of the test statistic occuring in this region given the null hypothesis. Therefore, we have more confidence in a p-value that is closer to 0 than closer to the crtiical value set by alpha.

#32 b. *(1 of 3 points)*
We have talked about income being an example of a skewed variable. Why don't we need to worry about the distribution of income when we construct the sampling distribution?

As long as the population distribtion is normal and the samples are chosen randomly and of equal sample size, the the sampling distribution will be normally distributed with the same mean of the population.

#35 b. *(1 of 3 points)*
Provide a technical interpretation of the 95% confidence interval.

The interval between 8.41 and 12.99 represents our confidence in our point estimate of the population mean. We cannot know for certain where the population mean truely lies, but we can construct an interval of values for which we have a high degree of certainty (95%) that the true population mean will fall within.

#35 c. *(1 of 3 points)*
Why is presenting this confidence interval an improvement over conventional hypothesis testing?

The confidence interval not only estimates the value of the population mean, it also quantifies our confidence in that estimate. A more confident estimate corresponds to a more narrrow confidence interval.

#36 d. *(0 of 4 points)*
Explain why the test result is staistically significant but not pratically significant. In other words, how can we have a statistically significant difference but such a small effect?

The sample size of the experiment ($n = 25000$) is large enough that a hypothesis test can detect a small difference that is statisticaly significant, but practically insignificant.

#37 *(1 of 3 points)*
Briefly explain what is meant by the homogeneity of variance assumption in between-subjects designs.

This assumes that comparison groups have equal variance. ANOVA is tolerant to violations of equal variance as long as group sizes are similar. If variance is not equivalent and group sizes are not similar, this can lead to type I errors for groups with small sample sizes and decreased power for groups with large sample sizes.

#38 *(3 of 6 points)*
Imagine that you are comparing a sample of vegetarians to a sample of mean-eaters on cholestorol levels. If the effect size is expected to be 0.6 and we want an equal number of people in each group, how many people total would be required to attain a power level of 0.85? Assume that $\alpha = 0.5$ and that you will conduct a two-tailed test.

#39 d. *(0 of 3 points)*
Suppose Dr. Bowles is interested in whether each of the two classical music groups differs from the control group. Of these *post-hoc* tests that we have discussed, which would be most powerful for addressing this research question?

The most powerful post-hoc test would be Dunnett's test.

#39 e. *(0 of 4 points)*
Show how the first score in the control group ($X_{11} = 9$) can be decomposed according to the general linear model. Make sure to label all of the terms.

$Y_{ij} = \mu + \alpha_j + \epsilon_{ij}$
$Y_{ij} = 11.56 + -2.56 + 0 = 9$

$\alpha_j = \mu_j - \mu$
$\alpha_j = 9 - 11.56 = -2.56$

$\epsilon_{ij} = Y_i - \mu_j$
$\epsilon_{ij} = 9 - 9 = 0$

Y_{ij} is the score for individual i in group j. μ is the grand mean. α_j is the group effect for group j. $\epsilon)ij$ is the uniqueness for individual i.

#40 a. *(4 of 6 points)*
Showing all of your work, carry out a two-tailed independent samples t-test comparing the two group means ($\alpha = 0.05$). Make sure to state your conclusion.