Classroom Voting Questions: Statistics

Use and Abuse of Tests

1. Robert is asked to conduct a clinical trial on the comparative efficacy of Aleve versus Tylenol for relieving the pain associated with muscle strains. He creates a carefully controlled study and collects the relevant data. To be most informative in his presentation of the results, Robert should report

   (a) whether a statistically significant difference was found between the two drug effects.

   (b) a P-value for the test of no drug effect.

   (c) the mean difference and the variability associated with each drug's effect.

   (d) a confidence interval constructed around the observed difference between the two drugs.

   Answer: (d). (A) Reporting only a statistically significant difference is the least informative.

   (B) Reporting a p-value is more informative than reporting only a statistically significant difference (answer (A)) and more informative than reporting the mean difference and variability (answer (C)), but not as informative as reporting a confidence interval (answer (D)).

   (C) Reporting the mean difference and the variability gives no indication of statistical significance.

   (D)* correct   A confidence interval simultaneously provides information about the mean differences, variability, direction, a sense of minimum and maximum effect, as well as a conservative and unconservative estimate.

   by Murphy, McKnight, Richman, and Terry

   STT.06.03.010

   CC HZ MA207 F09: 71/0/17/**12** time 2:00
   CC KC MA207 F09: 73/15/8/**4** time 2:30
   CC KC MA207 F15: 100/0/0/**0** time 2:30
   CC KC MA315 F15: 47/0/0/**53** time 2:00
   CC KC MA315 F18: 69/3/0/**28**
   CC KC MA315 S19: 69/0/12/**19**
   CC KC MA315 S20: 41/22/0/**37**

2. A *P*-value represents

    (a) the probability, given the null hypothesis is true, that results like these could have been obtained purely on the basis of chance alone.

    (b) the probability, given the alternative hypothesis is true, that the results could have been obtained purely on the basis of chance alone.

    (c) the probability that the results could have been obtained purely on the basis of chance alone.

    (d) Two of the above are proper representations of a *P*-value.

    (e) None of the above is a proper representation of a *P*-value.

Answer: (a). (A)* correct This answer gives the definition of p-value.

(B) The definition of p-value is not conditional on the alternative hypothesis because the probability that the alternative hypothesis is difficult to determine (The Bayesian Problem).

(C) A hypothesis test begins with the assumption that the null hypothesis is true (a conditional probability, not an unconditional probability).

(D) Only A is correct.

(E) A is correct.

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CC HZ MA207 F09: **18**/6/47/23/6 time 2:00
CC KC MA207 F09: **44**/18/15/7/15 time 2:30
AS DH MA3321 Su12: **60**/0/27/7/7 time 1:50
AS DH 3321 010 S14: **39**/33/6/17/6 time 2:30 ,
CC KC MA207 F15: **18**/55/0/27/0
CC KC MA315 F15: **100**/0/0/0/0
CC KC MA207 F18: **90**/10/0/0/0
CC KC MA315 F18: **81**/3/3/0/13
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3. Two studies investigating the effect of motivation upon job performance found different results. With the exception of the sample size the studies were identical. The first study used a sample size of 500 and found statistically significant results, whereas the second study used a sample size of 100 and could not reject the null hypothesis. Which of the following is true?

    (a) The first study showed a larger effect than the second.

    (b) The first study was less biased than the second study for estimating the effect size because of the larger sample size.

(c) The first study results are less likely to be due to chance than the second study results.

(d) Two of the above are true.

(e) All of the above are true.

Answer: (c). Note: P-value is implicit in this question because of the phrase "statistically significant results" (i.e., The results are statistically significant if and only If the observed P-value is less than the fixed α).

(A) The P-value confounds effect size and sample size.

(B) Both samples will give unbiased results if they are random samples.

(C)* correct The first study's results are statistically significant so the p-value must be smaller than the one from the second study; therefore, the first study's results are less likely due to chance.

(D), (E) Only (C) is correct.

by Murphy, McKnight, Richman, and Terry

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CC KC MA207 F09: 0/4/**7**/82/7 time 3:30
AS DH MA3321 Su12: 17/8/**25**/33/17 time 2:10
CC KC MA315 F15: 0/0/**41**/53/6 time 2:00
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CC KC MA315 F18: 3/3/**42**/48/3
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