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| **23-2** If X=pnorm(rnorm(n), where rnorm(n) generates n random samples from the standard normal distribution, and pnorm is the cumulative distribution function (CDF) of the standard normal distribution, then:   * Each value of X is the result of applying the CDF of the standard normal distribution to a standard normal random variable.   Thus, X will follow a **uniform distribution on the interval [0,1]**. | **Explanation:**   * rnorm(n) generates random variables from a standard normal distribution (mean 0, standard deviation 1). * The CDF of a continuous random variable transforms the variable into a probability that the random variable is less than or equal to a given value. * The CDF of the standard normal distribution transforms standard normal random variables into uniform random variables on [0,1], because the CDF maps any real number into the probability range [0,1].   **Thus, X∼Uniform(0,1).** |
| **23-4** Given P(A)=0.5P and P(B)=0.6 which one is true **Choose ONE!**  **GPA nieden**   1. A and B are independent 2. A and B are not independent 3. A and B are mutually exclusive 4. A and B are not mutually exclusive 5. None of the above must be true   **a. A and B are independent:**  For two events to be independent, P(A∩B)=P(A)P(B)  We don't have enough information about P(A∩B).  Therefore, this **doesn't have to be true**. | **b. A and B are not independent:**  Since we don’t know if P(A∩B)=P(A)P(B) or not, we can't say for sure  if they are dependent or independent.  Thus, this **doesn't have to be true** either  **c. A and B are mutually exclusive:**  If events are mutually exclusive, then P(A∩B)=0. However, we can't determine P(A∩B) from the information given, so this **doesn't have to be true**.  **d. A and B are not mutually exclusive:**  Again, without knowing P(A∩B) we cannot determine if the events are mutually exclusive or not. This **doesn't have to be true**. |
| p(A)=0.5 p(B)=0.6 if P(A^B)=0 -> P(AUB)=0.5+0.6>1 not possible   1. A and B are independent 2. A and B are not independent 3. A and B are mutually exclusive 4. A and B are not mutually exclusive ??? 5. None of the above must be true   The statement that **two events can be both independent and mutually exclusive** is **false**.  Now, consider what happens if two events are both mutually exclusive and independent:  The only way for both of these conditions to be true at the same time is if **either P(A)=0 or P(B)=0 P**, meaning that one of the events has no chance of happening. In this case, the events are trivial, and it's not meaningful to discuss their independence.  So, **non-trivial events cannot be both mutually exclusive and independent**. Therefore, the statement is **false**. | * **Mutually exclusive events** cannot happen at the same time. If A and B are mutually exclusive, then P(A∩B)=0, meaning there is no overlap between the events. * **Independent events** means the occurrence of one event does not affect the probability of the other. If A and B are independent, then   P(A∩B)=P(A)×P(B).  P(A/B)=P(A)  P(A∩B)=0) and P(A∩B)=P(A)×P(B). => P(A)=0 or P(B)=0  **GTP e**  **A and B are not mutually exclusive**: While we know they can't be mutually exclusive (since their sum is greater than 1), that alone doesn’t imply anything specific about their other relationships.  Thus, **none of given options must be true based solely on the information provided**. |
| **GPA los odgovor**  You have water temperatures from two different lakes in Wisconsin, and want to run a permutation test to see if there is evidence that the mean temperatures are different. You have 16 measurements from Lake A and 21 measurements from Lake B. Our test statistic is the difference of sample means. Why would you want to run the Monte Carlo simulation with 10,000 replicates rather than 100 to produce a distribution of test statistics? **Choose ONE!**  **GTP Odgovor pod**  You're right to clarify that in a permutation test, we are repeatedly shuffling and re-sampling the same data, not collecting more data. So let’s reconsider the reasoning:  For permutation tests, increasing the number of replicates helps achieve a more stable and accurate approximation of the distribution under the null hypothesis, not by changing the sample size, but by reducing variability in the simulated test statistic distribution. So the correct answer remains **a.**:  **a. 10,000 replicates lowers the standard error significantly.**  Even though the sample size isn't changing, more replicates (permutations) still improve the stability of the estimate by reducing random fluctuations in the test statistic's distribution, resulting in a more accurate assessment of the p-value. | 1. 10,000 replicates lowers the standard error significantly 2. 10,000 replicates eliminates sampling bias due to flawed data collection 3. 10,000 replicates compensates for any difference in population variance 4. 10,000 replicates decreases α while maintaining the power of the test 5. None of these are valid reasons |
| **SA-3 Odgovori pod Trimax da se proverar** |  |
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| **S24- MC6 izmesani odgovori** |  |
| **S24-M8 M9 GTP za variance konstantna linija** | Let be X1,…Xn an i.i.d. (i.e. independent and identically distributed) sample where Xi has μ mean and σ2 variance .  Which of the following shows the EXPECTED (i.e. typical) relationship between the sample variance S 2  and n? recol |
| Which of the following shows the EXPECTED (i.e. typical) relationship between the mean variance Var(**xmean**) and n? Recall |  |
| SA2 candies conditional probabilities are used. But you are taking the candies without replacement from the bag can use **hypergeometric distribution**.    **Prasanje do GTP** |  **Population size (N)**: Total number of candies = 48   **Number of successes in the population (K)**: Total number of candies you like (blue + orange) = 4 + 8 = 12   **Sample size (n)**: Number of candies you will choose (this is the number you're interested in; let's assume you want to find the probability of choosing all 12 you like from your sample).   **Number of successes in the sample (k)**: Number of candies you like chosen = 12 |
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340\_Midterm in class .html

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| MC1You run a test with a significance level of 0.05, and calculate a p-value of 0.134. Which of the following is a valid conclusion?   1. **NE The test provides conclusive** evidence that the null hypothesis is true. 2. The test tells us that there’s only a 13.4% chance that the null hypothesis is true. 3. The test suggests that our significance level was set too low, we should re-run the test with a higher significance level. 4. The test tells us if H0 were true there’s a 13.4% chance data like ours (or more extreme) would be observed.   The test provides evidence that there is a 86.4% chance that the alternative hypothesis is correct. | **Odgovor pod d? I GTP d**  **"The test tells us if H₀ were true, there’s a 13.4% chance data like ours (or more extreme) would be observed."**  This is the correct interpretation of the p-value. A p-value represents the probability of obtaining results at least as extreme as those observed, under the assumption that the null hypothesis is true. It **does not** indicate the probability that the null or alternative hypothesis is true directly.  The other statements are incorrect for the following reasons:   * **The test provides conclusive evidence that the null hypothesis is true**: A p-value does not prove the truth of the null hypothesis; it only indicates the strength of evidence against it. * **The test tells us that there’s only a 13.4% chance that the null hypothesis is true**: P-values do not provide probabilities about the hypotheses themselves. * **The test suggests that our significance level was set too low**: There's no need to change the significance level based solely on a higher p-value unless there is a specific rationale to do so beforehand. * **The test provides evidence that there is an 86.4% chance that the alternative hypothesis is correct**: This is a misinterpretation of the p-value, which doesn't give the probability of the alternative hypothesis being true. |
| MC5 i MC6 | **MC5 MC6 next two questions are based on the following plot.**  Four tests are considered to test the hypothesis H0:θ=0,  H1:θ>0, at a significance level of α=0.05. The power graph above give v.s.s the rejection rate of each test depending on the effect size (the true θ value). The nominal α=0.05 value is shown with a horizontal line.  **MC5**: Test 2 is ***always better*** than which other test?   1. Test 2 2. Test 3 3. Test 4 4. All other tests 5. None of the other tests   **MC6**: Which test fails to control the type I error rate?   1. Test 1 2. Test 2 3. Test 3 4. Test 4 5. None of the tests fails |
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