Take-home 1. Question

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| GDP prasanje  We have 3 sets of 1km cable of 3 manufecturers Question :  "A colleague suggests that we should focus our attention on a comparison of Alderwood and Brentwick (ignoring Coppergrove), since they seem to have the largest gap in average number of flaws. Why specifically would this not be a good approach?  My answer: "Focusing only on Alderwood and Brentwick while ignoring Coppergrove is not a good approach because it excludes relevant data, leading to biased analysis and potentially false conclusions. Coppergrove's data might provide critical context or reveal overarching trends across all facilities that could explain the differences. Analyzing only two facilities reduces the validity of the results and contradicts standard statistical principles, which require using all relevant data to ensure robust and accurate comparisons."  TA answer: "If we selectively ignore Coppergrove we will be cherry-picking data. You could call this selection bias as well. This will lead us to potentially find a ‘significant’ result by ignoring the variability of the other site. Essentially we’re performing multiple tests and only keeping the one result that gives us a low p-value. You could call this p-hacking. The main consequence is an increased risk of Type 1 error." Is my answer correct? | GDP odgovor  Your answer touches on the broader principles of statistical validity and avoiding biased analysis but doesn’t directly address the key statistical concerns like p-hacking or the increased risk of a **Type I error**. The teaching assistant's answer delves into these more specific issues.  **Your Answer:**   1. **Strengths:**    * You correctly highlight that ignoring Coppergrove introduces bias and reduces the robustness of the analysis.    * You also acknowledge the importance of considering all available data to ensure accurate conclusions. 2. **Weaknesses:**    * It doesn’t explicitly explain how ignoring Coppergrove could lead to *cherry-picking* or *p-hacking* (selecting subsets of data to achieve a desired result).    * You don't mention the risk of inflating the Type I error rate, which is central to the problem. |
|  | **TA's Answer:**  The teaching assistant provides a more targeted statistical critique by:   * Explaining that focusing only on Alderwood and Brentwick could be seen as *cherry-picking* data, introducing **selection bias**. * Highlighting that ignoring variability from Coppergrove can lead to misleadingly low p-values (a form of **p-hacking**). * Connecting this behavior to an increased **Type I error rate**, where a false positive result is more likely to occur. |
| ****Conclusion:**** Your answer is correct in its general principles but could be improved by including the specific risks of p-hacking and inflated Type I errors, as the TA did. To combine the strengths of both responses, you might revise your answer as follows: | **Revised Answer:** Focusing only on Alderwood and Brentwick while ignoring Coppergrove introduces bias by selectively excluding data, which could distort the analysis. This is effectively cherry-picking or a form of **selection bias**. By ignoring Coppergrove's variability, we risk drawing conclusions based on incomplete evidence, which increases the likelihood of a misleadingly low p-value. This behavior, known as **p-hacking**, inflates the risk of a **Type I error**, leading to false positives. To ensure robust and accurate results, it is critical to analyze all three manufacturers together to account for variability across all data. |
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