Quiz 5

*Disclaimer: This problem is motivated by data collected from the study described below, but has been modified for the purpose of this quiz.*

Our midterm presented data from Dr. Hagobian’s research which examined the impact of BPA on glucose metabolism. I wasn’t totally honest with you on our midterm. He really had only 11 subjects (not 44). Each of the 11 subjects ate *both* types of cookies on two separate visits, one visit in December and the second in February. On one visit they ate the BPA-laced cookie and, on a different day, a placebo cookie (with no BPA). Thirty minutes after eating the cookie on each occasion, they were given a glucose tolerance test to measure their glucose metabolism as well as other blood tests to measure levels of estrogen, pro-insulin, and c-peptide in the blood.

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| --- | --- | --- | --- |
| Cookie | Mean | SD | n |
| Placebo | 5.259 | 0.762 | 11 |
| BPA | 5.355 | 1.462 | 11 |
| Difference: Placebo - BPA | -0.095 | 1.153 | 11 |

A summary of the glucose test results (mmol/L) after eating each type of cookie as well as the difference in glucose results for each subject is shown to the right.

1. [4] For simplicity, Dr. Hagobian could have given all subjects the BPA cookie on their first visit in December, and the Placebo cookie on the second visit in February, but he didn’t. Instead, when a subject came for their first visit, he flipped a coin. If it was heads, they received BPA on that visit (and Placebo on their second visit). If it was tails they received the placebo cookie first. Why did he add this extra coin flipping step instead of the simpler approach of just giving everyone one type of cookie in December and the other in February?
2. [6] Use the data shown above to construct an approximate 95% confidence to compare the mean glucose levels after eating BPA versus Placebo cookies. *Round your final interval values appropriately.*
3. [4] In order to trust the interval you just computed, you should be concerned about the normality of the data? Why? *Briefly explain.*
4. [1] Regarding normality, which data should you be concerned about, (1) the glucose data from the Placebo and BPA trials, (2) the within subject glucose differences, (3) neither, or (4) both? *No explanation needed.*
5. [2] If the data were suspected to be non-normal, and you wanted to carry out a hypothesis test to determine whether or not glucose metabolism is affected by BPA exposure, what statistical test would you use? *Name the test.*