QUIZ MODULE 4 – CLASS #2

Question 1

A randomized clinical trial (RCT) did not find statistical significance comparing the experimental restorative treatment A and the conventional technique. However, a systematic review of RCTs published three months later showed that this technique A is superior to the conventional restorative treatment. What is the probable error type that occurred?

Alternatives	feedback
a) Type I error	Incorrect – This error type is the opposite. It occurs when the study found a statistical significance, but other studies are consistent that this difference does not exist.
b) Type II error	Correct – This is a probable type II error, which occurs when the statistical significance is not found, but studies are consistent in finding differences. These error types can occur due to a lack of adequate statistical power and can be due to a small sample size.
c) Any error occurred. Probably the error happened in the systematic review	Incorrect – Systematic reviews are studies that aggregate RCTs, increasing the statistical power and generalizability compared with individual studies. Therefore, it is more probable that the individual study (RCT) had reached the wrong conclusion.

Question 2

Considering the table, choose the correct alternative:

Table: Comparisons among mean (standard deviation) of erosive tooth wear (µm) with different soft drinks

Soft drinks (Groups)	Erosive tooth wear (µm)
Regular soda	2.15 (0.65) A
Light soda	0.52 (0.19) B
Zero soda	0.54 (0.17) B
Different letters represent statistically significant diferences among the beverages (p = 0.027)	

Answer	feedback
a) Regular soda provokes a statistically significantly more severe erosive tooth wear	Correct – regular soda is the only group that was statistically different from the light and zero soda, and the mean of erosive tooth wear was higher.
b) There were no significant differences among the groups, although regular soda presented higher erosive tooth wear	Incorrect – The statistical test presented a p-value of 0.027, which is lower than 5%. Therefore, the null hypothesis was rejected; consequently, the alternative hypothesis was accepted.
c) Light soda presented more severe erosive tooth wear	Incorrect – Actually, light soda presented the lowest values of erosive tooth wear; moreover, it did not showed difference compared to the light soda.

Question 3 Which of the alternatives below is correct?	
Answer	**feedback**
a) α (alpha) is the probability for the occurrence of a type II error, and it is also known as significance level.	Incorrect – α (alpha) is known as significance level indeed, but it is the probability for the occurrence of a TYPE I ERROR.
b) The p-value is the tolerable limit of probability of the study rejecting the null hypothesis, given that the null hypothesis is true.	Incorrect – This definition is for significance level, that is, the cutoff adopted by the research as tolerable to reject the null hypothesis or the tolerable limit for the type I error occurrence. The p-value is a measure calculated by the statistical test that leads the researcher to make a decision. P-values higher than the significance level led to null hypothesis acceptance, while values below will indicate the rejection of the null hypothesis.
c) The lack of statistical power can lead to type II error and can be related to the study sample size.	Correct – The lack of statistical power is related to TYPE II ERROR. The most common cause for the occurrence of this error type is actually the small sample sizes, but other factors can be involved.