Stat Support Activity: Two-Population Mean Confidence Interval Calculations

Notes: Two-Population Mean Confidence Interval Formula (Independent Groups)

$$(\bar{x}_1 - \bar{x}_2) \pm \left(T_c \times \sqrt{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} \right)} \right)$$

1.

Cotinine is an alkaloid found in tobacco and is used as a biomarker for exposure to cigarette smoke. It is especially useful in examining a person's exposure to second hand smoke. A random sample of 90 non-smoking American adults was collected. These adults were not smokers and did not live with any smokers. The sample mean average cotinine level for this sample was 7.2 ng/mL with a sample standard deviation of 5.8 ng/mL. A second sample of 85 non-smoking American adults was then collected. These adults did not smoke themselves, but did live with one or more smokers. The sample mean average cotinine level for this sample was 28.5 and had a sample standard deviation of 11.4. Population 1 was people that do NOT live with smokers (μ_1) and population 2 was people that DO live with smokers (μ_2). Use the following formulas to create the following 95% two-population mean confidence interval for the difference between the independent groups ($\mu_1 - \mu_2$).

Sample 1: $n_1 = 90$, $\bar{x}_1$ = 7.2 , s_1 = 5.8

Sample 2: $n_2 = 85$, $\bar{x}_2$ = 28.5 , s_2 = 11.4

a) Calculate the sample mean difference $\bar{x}_1 - \bar{x}_2$.

b) Calculate the standard error using the following formula:

   Standard Error = $\sqrt{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} \right)}$ =

c) Calculate the Margin of Error using the following formula and the answers to part (b). (The critical value T-score (T_c) = 1.979)

   Margin of Error = $T_c \times Standard\ Error$

d) Calculate the confidence Interval lower limit. Use the answers to part (a) and part (c).

   $(\bar{x}_1 - \bar{x}_2) - Margin\ of\ Error$

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e) Calculate the confidence Interval lower limit. Use the answers to part (a) and part (c).

$(\bar{x}_1 - \bar{x}_2) + Margin\ of\ Error$