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SOCI 213/4 - Statistics I
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Assignment 1:

1. Find the simple regression equation for the relationship between Y & X_1, and explain its meaning as well as the meaning of its slope and constant. What would you predict for X_1=70%?
    - **a.** The simple regression equation is $Y = 12.36 - 0.003X_4$
    - **b.** The constant a = 12.36 → If $X_4 = 0$, then Y would decrease by 0.003 for infant mortality rate
    - **c.** For $X_1 = 70\%$, we predict y = 12.15
2. Find the multiple regression equation. Interpret its meaning and the meaning of its slopes and constant.
    - **a.** MRE: $Y = 160.914 - 1.05X_1 + 0.5X_2 + 0.002 X_3 - 0.003X_4$
    - **b.** The constant a = 160.914 means that if all X's = 0, then Y = 160.914 for infant mortality rate.
    - **c.** The partial slopes:
        - $b_1 = -1.05$ means if X_1 increases by 1%, Y decreases by 1.05, holding all other variables constant.
        - $b_2 = .05$ means if X_2 increases by 100 persons, Y increases by 0.05, holding other variables constant.
        - $b_3 = 0.002$ means if X_3 increases by 1, Y increases by 0.002, holding other variables constant.
        - $b_4 = -0.003$ means if X_4 increases by $1000, Y decreases by 0.003, holding other variables constant.
3. What is the predicted Y for a country with X_1=60, X_2=150, X_3=875 and X_4=$9000 ?
    - **a.** For X_1=60, X_2=150, X_3=875 and X_4=$9000, we predict Y = 80.164

4. Which independent variable has the greatest impact on the dependent variable? Rank the independent variables in order in terms of their impact on the dependent variable.
    - **a.** Independent variable X_1 has the greatest impact on the dependent variable.
    - **b.** Ranked
        1. X_1 (-1.041)
        2. X_4 (-0.76)
        3. X_2 (0.299)
        4. X_3 (0.169)
5. Given SSE=2174.24 and SST=7848.42, find the explained variance and interpret its meaning.
    - **a.** $R^2 = 0.723$
    - **b.** Therefore, all the X's in the equation collectively explain 72% of the variation of Y.
6. Find the unexplained variance and explain its meaning.
    - **a.** The remaining part of the variation is .28, meaning 28% is accounted for by the other variables and is called unexplained variance.