

PSYC 5322: Psychometrics

Tarleton State University

Homework 2

Spring 2020

1. Composite SAT scores consist of two subtests: Reading and Writing, which has mean $\mu_1 = 531$ and standard deviation $\sigma_1 = 104$, and Math, which has mean $\mu_2 = 528$ and standard deviation $\sigma_2 = 117$. In addition, the correlation between the two subtests is $\rho = 0.81$.
 - (a) Compute the mean composite SAT score.
 - (b) Compute the standard deviation for the composite SAT. Be sure to show the variance-covariance matrix for the two subtests.
 - (c) Suppose you score a 1250 on the composite SAT. What is your percentile rank?
2. Five students were given the following scores on three essay questions:

	Q1	Q2	Q3
Ann	9	8	7
Bill	5	3	4
Carol	8	8	7
David	7	6	8
Erin	6	5	7

- (a) Calculate the mean and standard deviation for each item.
 - (b) Compute the pairwise correlations between each item.
 - (c) Compute the variance-covariance matrix for the three questions.
 - (d) Compute the mean and standard deviation of the composite score that is found by summing the scores from the three essay questions.
3. For a battery of three subtests, the following variances were obtained:
 - for Test 1, $\sigma_1^2 = 9$
 - for Test 2, $\sigma_2^2 = 25$
 - for Test 3, $\sigma_3^2 = 16$.

Furthermore, the correlation between tests 1 and 2 is 0.81; between tests 1 and 3, 0.64; and between tests 2 and 3, 0.90.

- (a) Compute the variance-covariance matrix for the three subtests.
 - (b) Determine the variance of the composite test.