PSYC 4301: Psychological Tests and Measurements

Tarleton State University — Homework 3

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.