

PSYC 4301: Psychological Tests and Measurements

Tarleton State University

Exam 1

Spring 2021

Instructions: please complete each problem below and submit your completed exam in Canvas using one of two file formats: either (1) write your solutions on paper and scan to a PDF, or (2) embed photos of your solutions in a Word/OpenOffice document. On either method, please show (or describe) as much work as possible. Report your final answers rounded to 2 decimal places.

1. Consider the scores in the following table:

Score	Frequency
21-30	14
11-20	32
1-10	24

- (a) Calculate the percentile rank for a trait value of 17.
- (b) Calculate the trait value at the 65th percentile.
2. Calculate the Pearson correlation coefficient for the relationship between *Computer use* (measured in hours per day) and *Daily exercise* (measured in minutes per week) from the following data. Explain what your obtained correlation coefficient means about the relationship between computer use and daily exercise.

Computer use	4	3	7	6
Daily exercise	70	60	85	65

3. Use the phi coefficient to calculate the correlation between responses on two dichotomous test items (where 0 = incorrect and 1 = correct). Explain what your obtained correlation coefficient means about the relationship between these two test items.

Test item 1	1	0	0	1	0	0	0	1	1	0	0	1
Test item 2	0	1	1	0	1	1	1	1	1	1	0	0

4. A professor was interested in whether mode of attendance was associated with final exam grade. Eight university students were coded by their attendance preference as asynchronous (0) or synchronous (1), and their associated final exam grade (on a scale of 100) was recorded. Calculate the point-biserial correlation to assess the relationship between attendance mode and final exam grade. Explain what the obtained correlation coefficient means about this relationship.

Attendance mode	1	0	0	0	1	1	0	0
Final exam grade	75	82	74	97	91	85	79	65

5. Two psychological tests were used to measure conscientiousness and anxiety on an ordinal level. Calculate and interpret the Spearman correlation for the data below:

Conscientiousness	8	5	9	7	2	3
Anxiety	9	7	8	4	5	1

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6. The TMA (Test for Mathematical Ability) is a (fictional) standardized exam that is composed of three subtests: numerical reasoning (TMA-NR), algebraic proficiency (TMA-AP), and geometric thinking (TMA-GT). The mean and standard deviation of each subtest is listed below:

Subtest	Mean	Standard deviation
TMA-NR	145	43
TMA-AP	149	42
TMA-GT	139	48

Furthermore, the correlation between TMA-NR and TMA-AP is 0.56; between TMA-NR and TMA-GT, 0.73; and between TMA-AP and TMA-GT, 0.41.

- (a) Compute the mean composite TMA score.
- (b) Compute the standard deviation for the composite TMA. Be sure to show the variance-covariance matrix.
- (c) Suppose someone scores a 490 on the composite TMA. What is their percentile rank?