

# Quiz 4

Due	No due date	Points	20	Questions	10	Time Limit	None
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## Attempt History

	Attempt	Time	Score
LATEST	<a href="#">Attempt 1</a>	45 minutes	18 out of 20

Score for this quiz: **18** out of 20  
Submitted Nov 5 at 11:15am  
This attempt took 45 minutes.

Correct Answer

You Answered

Question 1

0 / 2 pts

(1) The correlation between two orthogonal predictor variables is:

☐

a. 1.0

☐

b. 0.0

☐

c. 0.5

☒

d. Correlation does not exist.

Question 2

2 / 2 pts

(2) Consider a regression model with predictor variables X1, X2, and X3. If X1 has a VIF value of 2, then the R-Squared value from regressing X1 on X2 and X3 is:

☐

a. 0.0

Correct!

☐ b. 0.25

☐ c. 0.75

☒ d. 0.50

### Question 3

2 / 2 pts

(3) How can multicollinearity affect regression models?

☐ a. Unstable regression coefficients, i.e. regression coefficients, will change sign as variables are added or deleted from the model.

☐ b. Estimates of regression coefficients will have large variances.

☐ c. Regression coefficients will show as statistically significant when they should not.

Correct!

☒ d. Regression coefficients will be both unstable, i.e. regression coefficients will change sign as variables are added or deleted from the model, and have large variances.

### Question 4

2 / 2 pts

(4) Diagnostics for multicollinearity include:

☐ a. The Overall F-Test

☐ b. Variance Inflation Factors

Correct!

- ☐ c. The condition index for the  $X'X$  matrix
- ☒ d. Both variance inflation factors and the condition index for the  $X'X$  matrix.

### Question 5

2 / 2 pts

(5) Suppose we have 5 variables:  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$ , and  $X_5$  in a data set with 2000 observations. We use the covariance matrix to compute the principal components. How many principal components are there?

Correct!

- ☐ a. 2
- ☒ b. 5
- ☐ c. 2000
- ☐ d. 400

### Question 6

2 / 2 pts

(6) Suppose we have 5 variables:  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$ , and  $X_5$  in a data set with 2000 observations. We use the covariance matrix to estimate the common factors. How many common factors are there?

Correct!

- ☐ a. 2
- ☐ b. 5
- ☐ c. 2000
- ☒ d. The number of common factors cannot be determined a priori.

**Question 7****2 / 2 pts**

(7) Given the variables  $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$ , and  $X_5$ . The eigenvector associated with the largest eigenvalue is  $(0.5, 0, -0.2, 0, 0.7)$ . How do we compute the first principal component?

- ☐ a.  $0.2(X_1 + X_2 + X_3 + X_4 + X_5)$
- ☐ b.  $0.5X_5 - 0.2X_3 + 0.7X_1$
- ☐ c.  $0.2(X_1 + X_2 + X_3 + X_4 + X_5)/5$
- ☒ d.  $0.5X_1 - 0.2X_3 + 0.7X_5$

**Correct!****Question 8****2 / 2 pts**

(8) If the sum of the eigenvalues is 90 and the second eigenvalue is 15, how much of the variance is explained by the second principal component?

- ☐ a. 85.0%
- ☒ b. 16.7%
- ☐ c. 15.0%
- ☐ d. 12.5%

**Correct!****Question 9****2 / 2 pts**

(9) Similarities between factor analysis and principal components analysis include:

Correct!

- ☐ a. Both aim to reduce the dimensionality of the data.
- ☐ b. Both are estimated with the assumption of an underlying statistical model.
- ☐ c. Both try to explain the correlations between the predictor variables.
- ☐ d. Both are not useful when the predictor variables are uncorrelated.
- ☒ e. Both aim to reduce the dimensionality of the data and are not useful when the predictor variables are uncorrelated.

### Question 10

2 / 2 pts

(10) Rotations are used in factor analysis to:

Correct!

- ☐ a. Improve the model fit.
- ☒ b. Improve the interpretability of the model.
- ☐ c. Change the number of common factors to include in the model.
- ☐ d. Increase the variance explained by the model.

Quiz Score: **18** out of 20