1 A factor can be considered to be an underlying latent variable:

(a) on which people differ

(b) that is explained by unknown variables

(c) that cannot be defined

(d) that is influenced by observed variables

(e) none of these

2 Variables that are orthogonal are:

(a) moderately correlated with each other

(b) perfectly related to each other

(c) rotated

(d) totally unrelated to each other

(e) none of these

3 Factor analysis is concerned with:

(a) analysis of correlation matrices

(b) correlating mean values

(c) frequency counts

(d) abstract concepts

(e) none of the above

4 Factor analysis requires that variables:

(a) Are measured at nominal level

(b) Are abstract concepts

(c) Are not related to each other

(d) Are related to each other

(e) Are standardized

5 The decision about how many factors to retain is based on:

(a) personal choice

(b) Kaiser's rule

(c) Scree test

(d) Both (a) and (c)

(e) Both (b) and (c)

6) The unrotated matrix is rotated because:

(a) The calculations are easier

(b) More factors are extracted

(c) Rotated factors are significant

(d) Interpretation is easier

(e) all of these

7) Kaiser's rule says:

(a) Select all factors where p<.5

(b) Select factors with eigenvalues that add up to 1

(c) Select factors with eigenvalues 1 and above

(d) Select the factor with the biggest Eigen value

(e) None of the above

8. The problem statement, all variables and given/known data

1. If A is a real symmetric matrix, then there is a diagonal matrix D and an

orthogonal matrix P so that D = P T AP.

a. True

b. False

9. Given that λi and λj are distinct eigenvalues of the real symmetric matrix A and that v1 and v2 are the respective eigenvectors associates with these values, then v1 and v2 are orthogonal.

a. True

b. False

10.If T(θ) is a rotation of the Euclidean plane 2 counterclockwise through an angle θ, then T can be represented by an orthogonal matrix P whose eigenvalues are λ1 = 1 and λ2 = −1.

a. True

b. False

11. If A and B represent the same linear operator T: U → U, then they have the same eigenvalues.

a. True

b. False

12. If A and B represent the same linear operator T: U → U, then they have the same eigenvectors.

a. True

b. False

13. If A and B have the same eigenvalues, then they are similar matrices.

a. True

b. False

14. Which of the following statements is not true?

a. Similar matrices A and B have exactly the same determinant.

b. Similar matrices A and B have exactly the same eigenvalues.

c. Similar matrices A and B have the same characteristic polynomial.

d. Similar matrices A and B have exactly the same eigenvectors.

e. none of the above

15. Let the n × n matrix A have eigenvalues λ1, λ2 ... λn (not necessarily distinct). Then det (A) = λ1λ2 ... λn.

a. True

b. False

16. Every real matrix A with eigenvalues as in problem 8 is similar to the diagonal matrix D = diag [λ1, λ2, ... λn].

a. True

b. False

17. Eigenvectors corresponding to distinct eigenvalues for any n × n matrix A are always linearly independent.

a. True

b. False

18.Which method of analysis does not classify variables as dependent or independent?

a. regression analysis

b. discriminant analysis

c. analysis of variance

d. factor analysis

19. Factor analysis is a(n) _____ in that the entire set of interdependent relationships is examined.

a. KMO measure of sampling adequacy

b. orthogonal procedure

c. interdependence technique

d. varimax procedure

20. Factor analysis can be used in which of the following circumstances?

a. To identify underlying dimensions, or factors, that explain the correlations among a set of variables.
b. To identify a new, smaller set of uncorrelated variables to replace the original set of correlated variables in subsequent multivariate analysis.
c. To identify a smaller set of salient variables from a larger set for use in subsequent multivariate analysis.
d. All are correct circumstances.

21._____ are simple correlations between the variables and the factors.

a. Factor scores
b. Factor loadings
c. Correlation loadings
d. Both a and b are correct

22.Factor analysis may not be appropriate in all of the following situations except:

a. a small value for Barlett's test of sphericity is found
b. small values of the KMO statistic are found
c. the variables are not correlated
d. the variables are correlated

23. A principal components analysis was run and the following eigenvalue results were obtained: 2.731, 2.218, .442, .341, .183, .085. How many factors would you retain using the eigenvalues to determine the number of factors?

a. 1
b. 2
c. 4
d. 6

24._____ should be used when factors in the population are likely to be strongly correlated.

a. Orthogonal rotation
b. The varimax procedure
c. Oblique rotation
d. None of the above
e.

25. Which of the following are eigenvectors of $\begin{bmatrix} 2 & 3 \\ 1 & 0 \end{bmatrix}$? (More than one answer may be correct.)

a) ☐ $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ b) ☐ $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$ c) ☐ $\begin{bmatrix} 5 \\ 5 \end{bmatrix}$

d) ☐ $\begin{bmatrix} -2 \\ 6 \end{bmatrix}$ e) ☐ $\begin{bmatrix} 1 \\ -3 \end{bmatrix}$ f) ☐ $\begin{bmatrix} -3 \\ 1 \end{bmatrix}$