Assignment - 11

Syllabus:

Factor analysis

1. To determine which variables relate to which factors, a researcher would use: (Marks - 1)
   (a) Factor loadings
   (b) Communalities
   (c) Eigenvalues
   (d) Beta coefficients

2. Which of the followings can be used to determine how many factors to take from a factor analysis: (Marks - 1)
   (a) Eigenvalues
   (b) Scree plots
   (c) % of variance
   (d) All of the above

3. Which of the following methods should be used when factors in the population are likely to be strongly correlated? (Marks - 1)
   a. Orthogonal rotation
   b. The varimax procedure
   c. Oblique rotation
   d. None of the above

4. A principal components analysis was run using correlation matrix, R, and the following eigenvalue results were obtained: 2.731, 2.218, .442, .341, .183, .085. How many factors would you retain? (Marks - 1)
   a. 1
   b. 2
   c. 4
   d. 6

5. Factor analysis may not be appropriate in all of the following situations except: (Marks - 1)
   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
6. A factor loading of 0.80 means that:
   (a) The variable is moderately related with the factor
   (b) The variable correlates well with the factor, though not perfectly
   (c) The variable is poorly related with the factor
   (d) There is no relationship between that variable and the factor

7. What technique is used to provide a simpler and interpretable picture of the relationships between factors and variables?
   (a) Rotation
   (b) Regression
   (c) Resistance
   (d) Principal components
   (e) residual analysis

8. In an exploratory study involving ten variables (X₁ to X₁₀), two factors are extracted using sample correlation matrix. The factor loadings are given below.

<table>
<thead>
<tr>
<th>Variables</th>
<th>X₁</th>
<th>X₂</th>
<th>X₃</th>
<th>X₄</th>
<th>X₅</th>
<th>X₆</th>
<th>X₇</th>
<th>X₈</th>
<th>X₉</th>
<th>X₁₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor 1</td>
<td>0.20</td>
<td>-0.30</td>
<td>0.40</td>
<td>0.50</td>
<td>-0.30</td>
<td>0.20</td>
<td>0.40</td>
<td>0.40</td>
<td>0.50</td>
<td>0.20</td>
</tr>
<tr>
<td>Factor 2</td>
<td>0.20</td>
<td>-0.30</td>
<td>0.30</td>
<td>0.40</td>
<td>0.30</td>
<td>-0.20</td>
<td>-0.30</td>
<td>-0.70</td>
<td>-0.80</td>
<td>-0.90</td>
</tr>
</tbody>
</table>

Choose the correct answer of the variability explained by factor 1 and factor 2, respectively.

(a) (11.8%, 15.4%)
(b) (10.8%, 19.9%)
(c) (12.8%, 25.4%)
(d) None of these

9. Choose the correct communality and specificity for the variable X₉, based on the data given in table in question 8.

   i) (0.79, 0.21)
   ii) (0.95, 0.05)
   iii) (0.89, 0.11)
   iv) None of these

(Marks - 1)  
(Marks - 1)  
(Marks - 4)  
(Marks - 2)
10. Choose the correct option in factor rotation (clock-wise) model from below, where:

(Marks - 2)

\[
\begin{align*}
\text{(i)} & \quad z_1 = x_1 \cos \theta + x_2 \sin \theta \\
& \quad z_2 = -x_1 \sin \theta + x_2 \cos \theta \\
\text{(ii)} & \quad z_1 = x_1 \sin \theta - x_2 \cos \theta \\
& \quad z_2 = -x_1 \sin \theta + x_2 \cos \theta \\
\text{(iii)} & \quad z_1 = x_1 \cos \theta + x_2 \sin \theta \\
& \quad z_2 = -x_1 \sin \theta - x_2 \cos \theta \\
\text{(iv) None of these}
\end{align*}
\]