1. Explore the personalitySubset dataset posted on blackboard datasets folder. Find and discuss the principal components that emerge.

This dataset has 10 variables, considering each variable has a variance of 1, we have a total variance of 10. By observing the Eigenvalue Table (Appendix A.1), it is evident that the first four principal components explain 2.53, 1.35, 1.32, and 1.05 units of variance, respectively. Using the Kaiser criterion, the fifth principal component barely misses to be added as another factor with an eigenvalue of 0.92. Looking at the Rotated Factor Pattern (Appendix A.2), we can decide which variable belongs to which factor. We can observe variables 'does a thorough job', 'helpful', and 'careless' belong to Factor1 which we can classify as Responsibility or Work Ethic, variables 'talkative' and 'reserved' fall under Factor2 which we can classify as Social Interaction, variables 'depressed' and 'relaxed' belong to Factor3 which can be Mood, and finally 'curious' and 'finds fault' belong to Factor4 which can be Critical Thinking. The variable 'original' doesn't distinctly fall under one of the principal components so we can remove it and re-run the test.

2. The owner of Al Bawadi restaurant has collected survey feedback from his customers on various aspects : Taste, Seating Comfort, Service, Presentation of food, Freshness and Décor. He now wants you to analyze the data. The data is available in the file called Al Bawadi. What factor pattern do you detect from this data? Name and interpret the factors.

We are given a dataset with 6 variables that reflect feedback from Al Bawadi restaurant customers. Considering each variable has a variance of 1, the total variance adds up to 6. By observing the Eigenvalue Table (Appendix B.1), it is evident that the first two principal components explain a major portion of the total variance with Eigenvalues of 2.88, and 1.86, respectively. Looking at the Rotated Factor Pattern (Appendix B.2), we can decide which variable belongs to which factor. We can observe variables 'taste', 'presentation', and 'freshness' belong to Factor1 which we can classify as Culinary Traits or Food Quality, other variables 'seating comfort', 'service', and 'décor' belong to Factor2 which we can classify as Dining Environment and Service. We can infer that for the 6 variables that customers have reflected on, there are 2 underlying dimensions called 'Dining Environment and Service' and 'Culinary Traits', which helps us to summarize and reduce data and avoid multicollinearity problems.

APPENDIX A

A.1

	Eigenvalues of the Correlation Matrix: Total = 10 Average = 1			
	Eigenvalue	Difference	Proportion	Cumulative
1	2.53009580	1.17545527	0.2530	0.2530
2	1.35464053	0.03521235	0.1355	0.3885
3	1.31942818	0.26808932	0.1319	0.5204
4	1.05133885	0.13550348	0.1051	0.6256
5	0.91583537	0.21613416	0.0916	0.7171
6	0.69970121	0.05431140	0.0700	0.7871
7	0.64538981	0.09747609	0.0645	0.8516
8	0.54791372	0.04003939	0.0548	0.9064
9	0.50787433	0.08009214	0.0508	0.9572
10	0.42778220		0.0428	1.0000

A.2

Rotated Factor Pattern (Standardized Regression Coefficients)		Factor1	Factor2	Factor3	Factor4
talkative	talkative	0.11181	0.80862	-0.01534	0.19851
finds fault	finds fault	-0.17588	-0.03574	-0.11578	0.76930
does a thorough job	does a thorough job	0.80146	-0.02710	-0.04281	0.15546
depressed	depressed	0.03741	-0.17612	-0.77782	-0.01577
original	original	0.37044	0.31743	0.23767	0.08548
reserved	reserved	0.26179	-0.82826	-0.11094	0.11257
helpful	helpful	0.61771	0.33138	-0.11971	-0.39112
careless	careless	-0.66488	0.16505	-0.20829	0.02909
relaxed	relaxed	-0.00411	-0.10727	0.84946	-0.06626
curious	curious	0.26245	0.13774	0.04808	0.63229

APPENDIX B

B.1

	Eigenvalues of the Correlation Matrix: Total = 6 Average = 1			
	Eigenvalue	Difference	Proportion	Cumulative
1	2.87916718	1.02360668	0.4799	0.4799
2	1.85556050	1.35181192	0.3093	0.7891
3	0.50374858	0.02787137	0.0840	0.8731
4	0.47587721	0.31394804	0.0793	0.9524
5	0.16192917	0.03821181	0.0270	0.9794
6	0.12371736		0.0206	1.0000

B.2

Rotated Factor Pattern (Standardized Regression Coefficients)		Factor1	Factor2
Taste	Taste	0.83804	0.01585
SeatingComfort	SeatingComfort	-0.00197	0.85145
Service	Service	0.07614	0.90577
Presentation	Presentation	0.92298	0.00858
Freshness	Freshness	0.89822	0.05905
Décor	Décor	0.01204	0.87862