Joe Griffin
Assignment 3
April 4, 2021

1. This can be subjective, but I would say there are 6 factors. There are only 5 factors that display an eigenvalue above 1, which is the latent root criterion. However, given the slope of the line, the sixth factor I believe should also be included (even though the eigenvalue is below 1) as the line starts to level off after that factor. The eigenvalue for this factor certainly seems to be above .6, which is usually the lowest you can go for a factor.
2. Looking at the eigenvalues in this table, I would probably include 5 factors. The sixth eigenvalue from the chart is much lower than the fifth, and it is right above the .6 cutoff (.62). Given that this value is right on the cutoff, I would probably not include this as a factor.
3. Factor 1: X18, X9, X16, potentially X11, potentially X17
   Factor 2: X6, X11, X13, X17
   Factor 3: X12, X7, X10
   Factor 4: X8, X14

   The main issue I see here is deciding what the threshold is for determining whether or not a factor has influence on a variable. This value typically ranges from .5 to .6 depending on sample size. If the sample size is large, one can count factors with values closer to .5. However, with very small sample sizes the values must be much closer to .6. Thus, determining which factors truly influence X11 and X17 depend on the threshold used, which should be determined by the sample size which is currently unknown. This lack of data then would be the main issue.

4. (All plots and tables attached at the end)
   a. Based on the scree plot, I would say there are 5 factors. There are 4 above the latent root criterion, and I would include the fifth factor as it appears to be part of the line before it levels off.
   b. Based on the eigenvalues of the correlation matrix, I would say there are 4 factors. 4 factors are above the 1.0 threshold, and the fifth is right about 0.6. Depending on the sample size, this might be included or not.
   c. Factor 1: X9, X16, X18, potentially X11
      Factor 2: X7, X10, X12,
      Factor 3: X14, X8
      Factor 4: X6, X11, X13
   d. The main potential issue I see with part C is saying that Factor 1 is a factor for variable X11. In this instance we know we have 100 samples, so the factor loading potential should be 0.55. However, it is important to note that this value assumes a 0.05 significance level, a power level of 80 percent, and standard errors are assumed to be twice those of conventional correlation coefficients. If any of these assumptions are not true, then the factor loading threshold may be

different and it’s possible that Factor 1 may no longer be considered a factor of X11, especially since Factor 4 is also a factor for X11. This potential issue could be solved by checking the data set to see that the assumptions are indeed accurate.

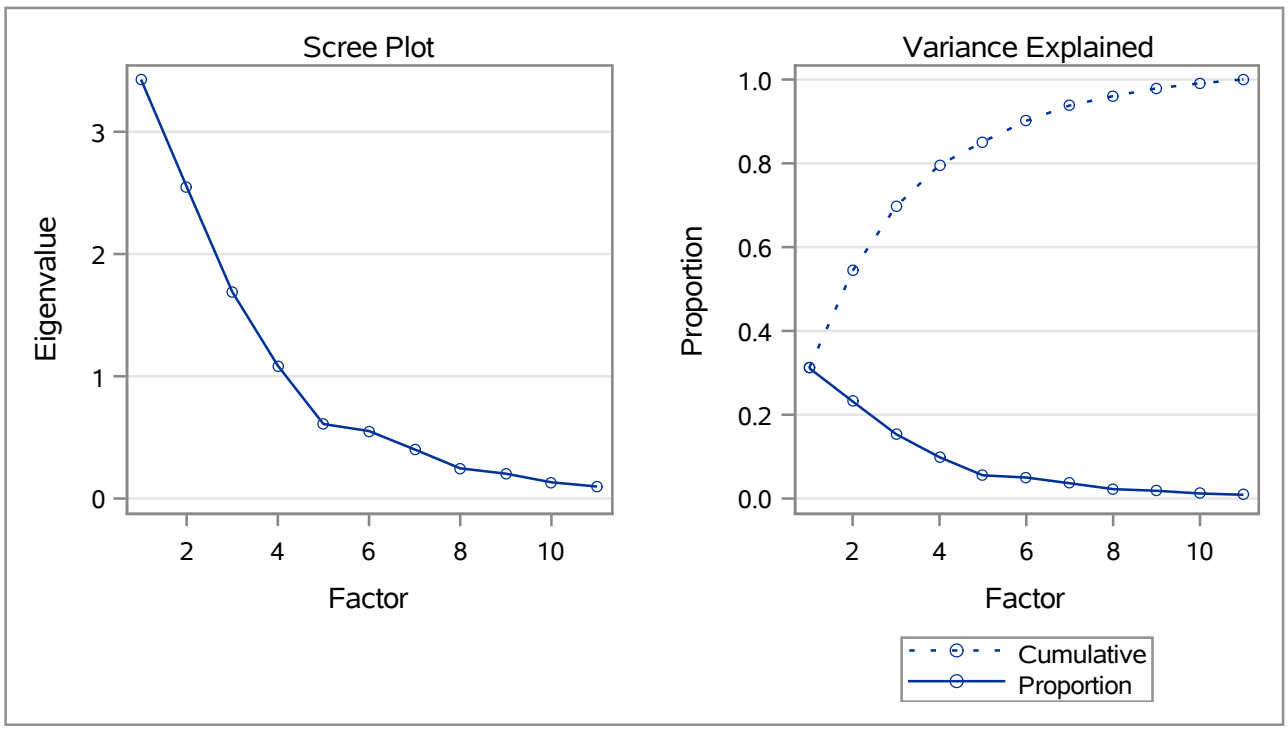
Input Data Type	Raw Data
Number of Records Read	100
Number of Records Used	100
N for Significance Tests	100

Initial Factor Method: Principal Components

Prior Communality Estimates: ONE

Eigenvalues of the Correlation Matrix: Total = 11 Average = 1				
	Eigenvalue	**Difference**	**Proportion**	**Cumulative**
1	3.42697133	0.87607462	0.3115	0.3115
2	2.55089671	0.85992024	0.2319	0.5434
3	1.69097648	0.60442042	0.1537	0.6972
4	1.08655606	0.47713196	0.0988	0.7959
5	0.60942409	0.05754032	0.0554	0.8513
6	0.55188378	0.15036563	0.0502	0.9015
7	0.40151815	0.15456660	0.0365	0.9380
8	0.24695154	0.04339828	0.0225	0.9605
9	0.20355327	0.07071169	0.0185	0.9790
10	0.13284158	0.03441456	0.0121	0.9911
11	0.09842702		0.0089	1.0000

4 factors will be retained by the NFACTOR criterion.



Initial Factor Method: Principal Components

Factor Pattern					
		Factor1	**Factor2**	**Factor3**	**Factor4**
x6	x6	0.24767	-0.50070	-0.08098	0.67039
x7	x7	0.30721	0.71314	0.30591	0.28392
x8	x8	0.29192	-0.36889	0.79447	-0.20159
x9	x9	0.87133	0.03105	-0.27354	-0.21506
x10	x10	0.34013	0.58083	0.11456	0.33137
x11	x11	0.71598	-0.45484	-0.15121	0.21150
x12	x12	0.37703	0.75177	0.31384	0.23159
x13	x13	-0.28081	0.66035	-0.06898	-0.34768
x14	x14	0.39418	-0.30613	0.77836	-0.19316
x16	x16	0.80938	0.04216	-0.21967	-0.24689
x18	x18	0.87579	0.11667	-0.30250	-0.20569

Variance Explained by Each Factor			
Factor1	**Factor2**	**Factor3**	**Factor4**
3.4269713	2.5508967	1.6909765	1.0865561

Final Communality Estimates: Total = 8.755401										
x6	**x7**	**x8**	**x9**	**x10**	**x11**	**x12**	**x13**	**x14**	**x16**	**x18**
0.76802937	0.77714736	0.89311235	0.88126008	0.57597858	0.78710502	0.85944643	0.64055781	0.89224653	0.76608666	0.91443037

Rotation Method: Varimax

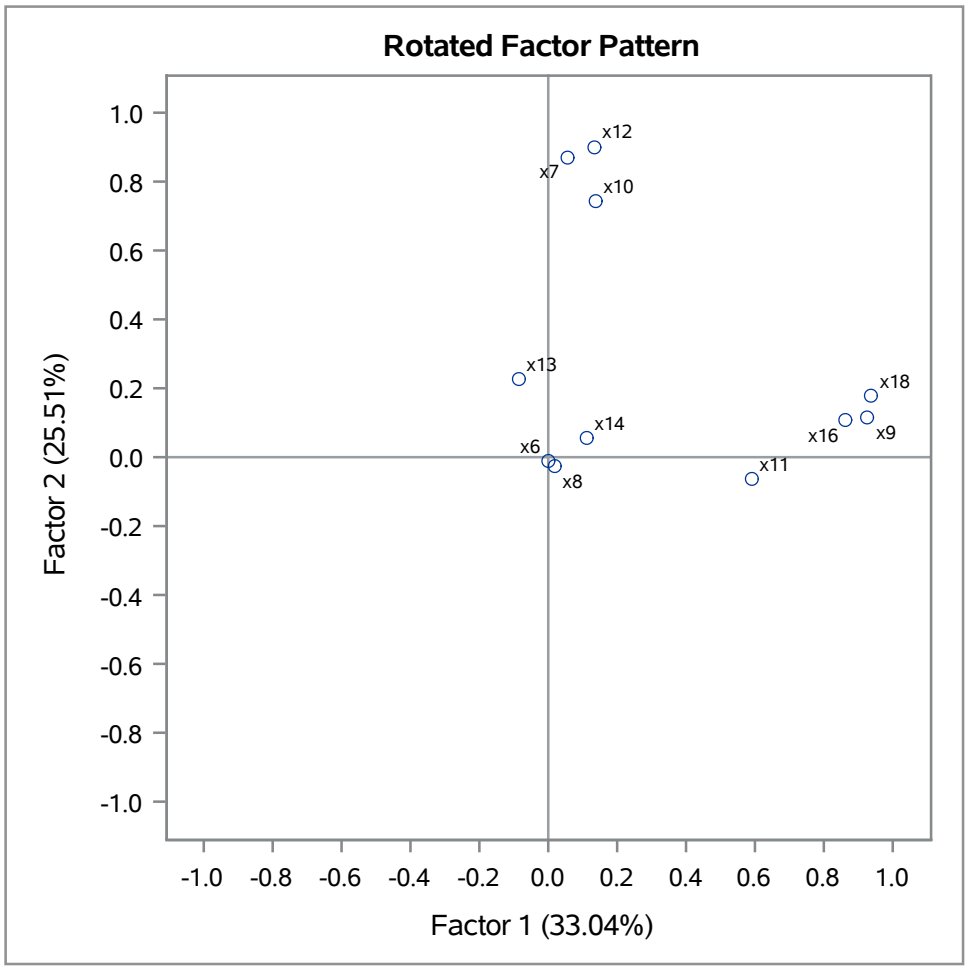
Orthogonal Transformation Matrix				
	1	**2**	**3**	**4**
1	0.85746	0.32216	0.27066	0.29617
2	0.01139	0.75813	-0.31201	-0.57250
3	-0.37572	0.32140	0.86750	-0.05464
4	-0.35139	0.46706	-0.27720	0.76259

Rotated Factor Pattern					
		Factor1	**Factor2**	**Factor3**	**Factor4**
x6	x6	0.00152	-0.01272	-0.03282	0.87566
x7	x7	0.05684	0.87056	0.04732	-0.11748
x8	x8	0.01845	-0.02444	0.93919	0.10051
x9	x9	0.92583	0.11589	0.04847	0.09123
x10	x10	0.13878	0.74151	-0.08164	0.01465
x11	x11	0.59124	-0.06398	0.14591	0.64200
x12	x12	0.13256	0.90045	0.07555	-0.15926
x13	x13	-0.08517	0.22561	-0.24550	-0.72259
x14	x14	0.10994	0.05485	0.93097	0.10218
x16	x16	0.86378	0.10680	0.08379	0.03930
x18	x18	0.93821	0.17731	-0.00476	0.05226

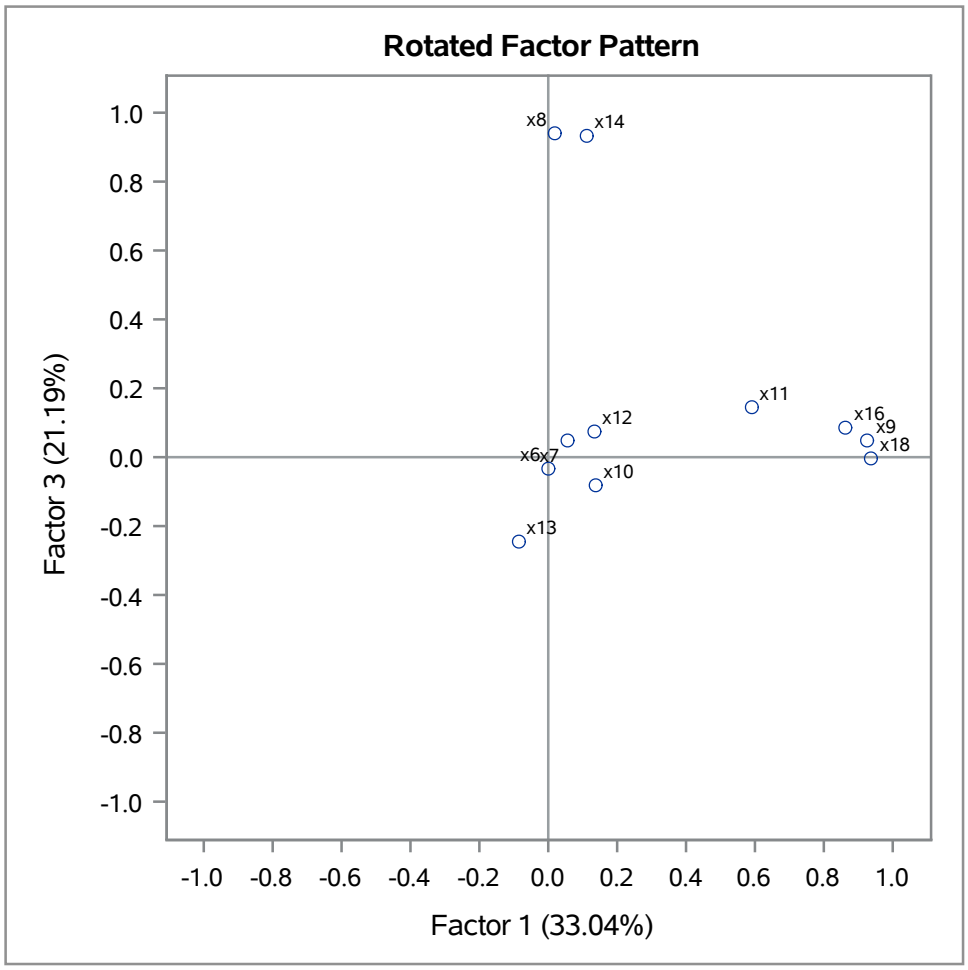
Variance Explained by Each Factor			
Factor1	**Factor2**	**Factor3**	**Factor4**
2.8928210	2.2335531	1.8554249	1.7736015

Final Communality Estimates: Total = 8.755401										
x6	**x7**	**x8**	**x9**	**x10**	**x11**	**x12**	**x13**	**x14**	**x16**	**x18**
0.76802937	0.77714736	0.89311235	0.88126008	0.57597858	0.78710502	0.85944643	0.64055781	0.89224653	0.76608666	0.91443037

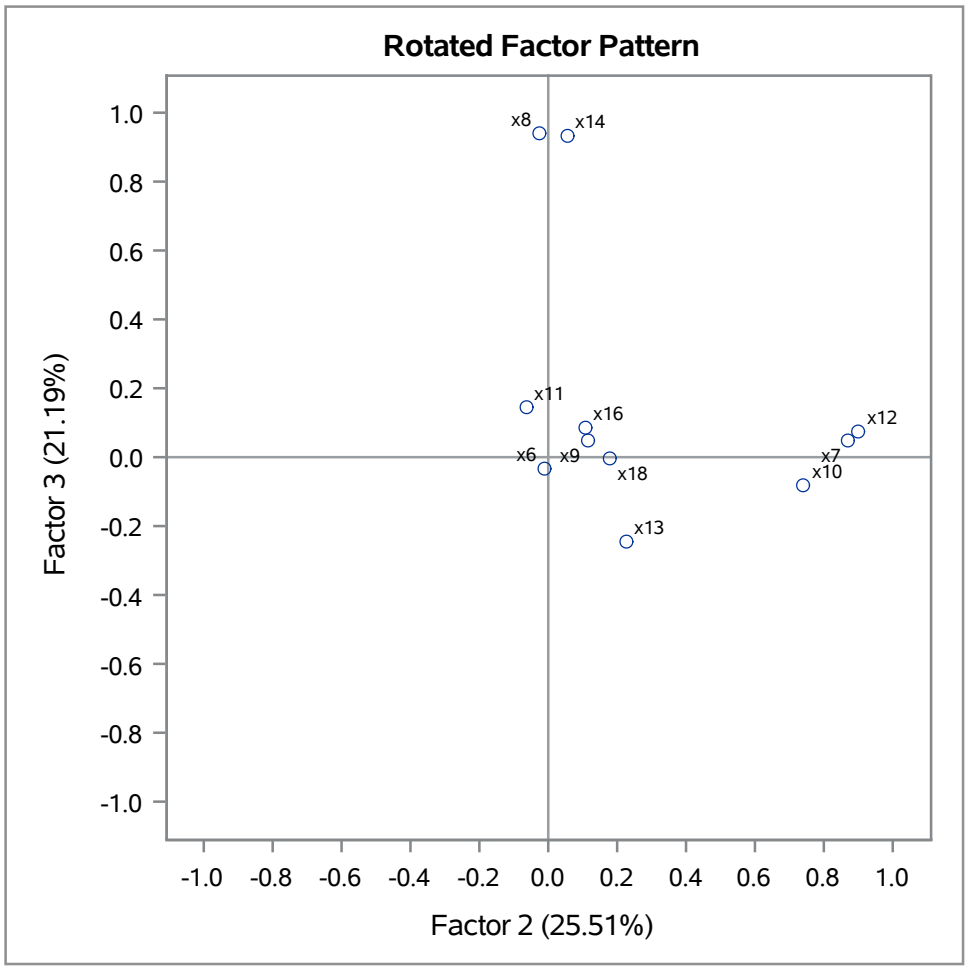
Rotation Method: Varimax



Rotation Method: Varimax



Rotation Method: Varimax



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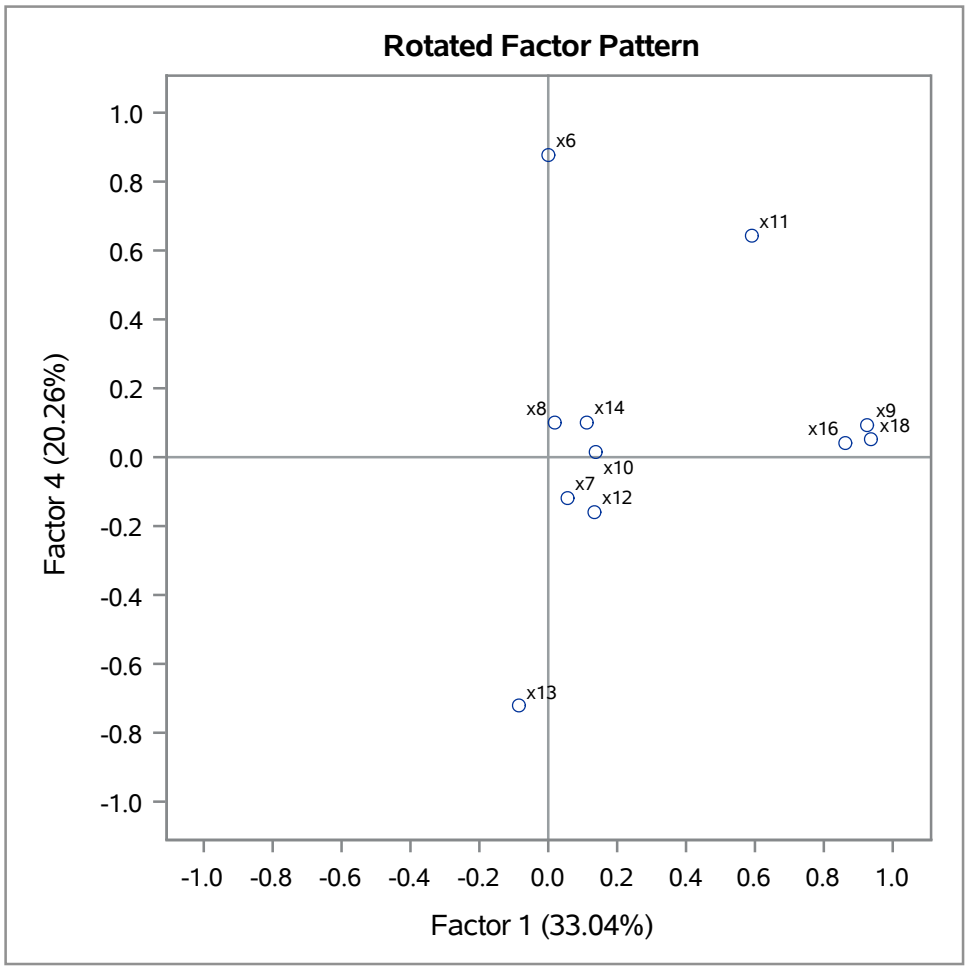

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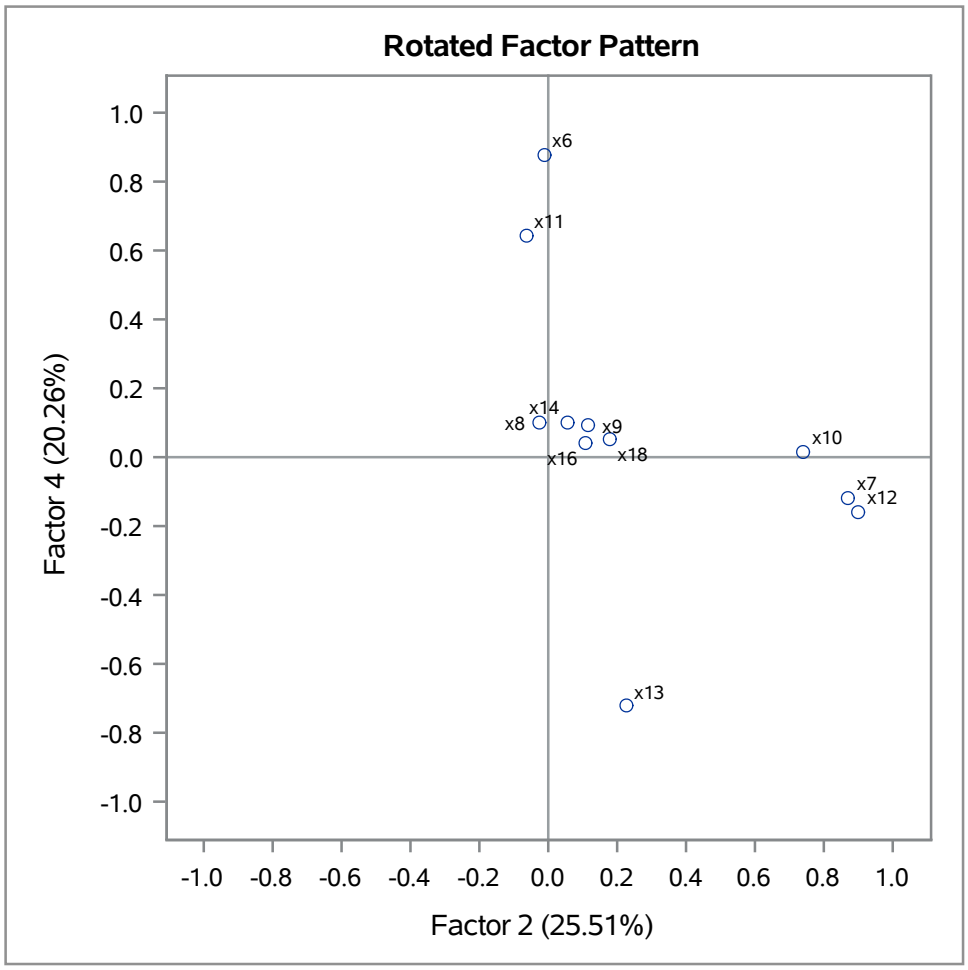
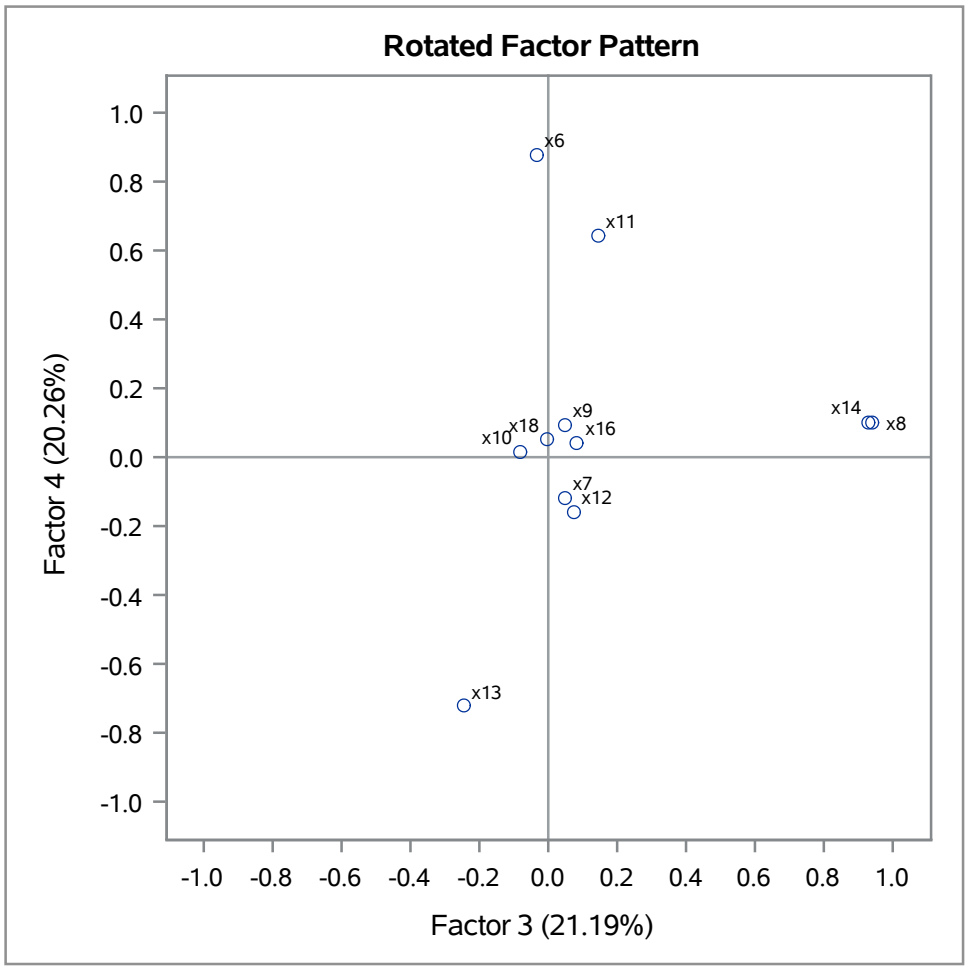


Rotation Method: Varimax



Rotation Method: Varimax