

Principal Components

```
/* walker4.sas */
title2 'Principal Components and Factor analysis';
%include 'walkread.sas';
options pagesize = 500;

proc factor method=prin nfactors=5 rotate=varimax reorder;
title2 'Five Principal Components'; /* Replicating Susan's Solution */
var wmq1 wmq3 wmq4 wmq6-wmq9 wmq11-wmq15 wmq17-wmq21 wmq23-wmq25
    wmq27 wmq29 wmq31 wmq33-wmq35 wmq37 wmq38 wmq40-wmq42 wmq45-wmq47;
```

The Walker Music Data 2
Five Principal Components
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The FACTOR Procedure
Initial Factor Method: Principal Components

Prior Communality Estimates: ONE

Eigenvalues of the Correlation Matrix: Total = 34 Average = 1

	Eigenvalue	Difference	Proportion	Cumulative
1	5.75378454	3.12122045	0.1692	0.1692
2	2.63256409	0.26429706	0.0774	0.2467
3	2.36826703	0.54816260	0.0697	0.3163
4	1.82010443	0.03577898	0.0535	0.3698
5	1.78432545	0.09637804	0.0525	0.4223
6	1.68794742	0.23126394	0.0496	0.4720
7	1.45668347	0.17619018	0.0428	0.5148
8	1.28049329	0.06788885	0.0377	0.5525
9	1.21260444	0.09307754	0.0357	0.5881
10	1.11952690	0.08448283	0.0329	0.6211
11	1.03504407	0.05121910	0.0304	0.6515
12	0.98382497	0.04591525	0.0289	0.6804
13	0.93790973	0.05246384	0.0276	0.7080
14	0.88544589	0.05280628	0.0260	0.7341
15	0.83263960	0.03462687	0.0245	0.7586
16	0.79801274	0.08024555	0.0235	0.7820
17	0.71776718	0.05324696	0.0211	0.8031
18	0.66452022	0.08563501	0.0195	0.8227
19	0.57888521	0.01826664	0.0170	0.8397
20	0.56061858	0.00708043	0.0165	0.8562
21	0.55353814	0.04604872	0.0163	0.8725
22	0.50748942	0.01151339	0.0149	0.8874
23	0.49597603	0.02822875	0.0146	0.9020
24	0.46774728	0.03632208	0.0138	0.9158
25	0.43142520	0.02972326	0.0127	0.9284

26	0.40170194	0.04206227	0.0118	0.9403
27	0.35963967	0.03547973	0.0106	0.9508
28	0.32415994	0.02276167	0.0095	0.9604
29	0.30139827	0.01747550	0.0089	0.9692
30	0.28392278	0.05291855	0.0084	0.9776
31	0.23100422	0.03109055	0.0068	0.9844
32	0.19991367	0.02839527	0.0059	0.9903
33	0.17151840	0.01192263	0.0050	0.9953
34	0.15959577		0.0047	1.0000

5 factors will be retained by the NFACTOR criterion.

Factor Pattern

	Factor1	Factor2	Factor3	Factor4	Factor5
wmq47	0.68842	-0.11184	-0.21175	-0.08065	0.05455
wmq33	0.63000	-0.07781	-0.29479	-0.17405	-0.17453
wmq34	0.56083	-0.36510	-0.05706	-0.05823	0.02849
wmq35	0.54464	0.01932	0.39487	-0.10532	0.02206
wmq24	0.53420	-0.01861	0.22631	-0.24756	-0.39549
wmq13	0.53277	-0.08707	-0.17112	-0.40850	-0.31699
wmq31	0.52578	0.23368	-0.37605	0.18613	0.06607
wmq38	0.48270	-0.24106	0.01774	0.27094	0.05155
wmq14	0.47477	0.33452	-0.01703	0.07926	-0.02270
wmq46	0.45806	0.05599	-0.01313	-0.31409	0.39596
wmq23	0.45772	-0.13311	0.07781	-0.34606	0.01539
wmq6	0.45722	-0.23692	0.14329	0.32124	-0.17684
wmq21	0.45064	0.31268	0.15629	-0.06513	-0.00729
wmq11	0.44130	-0.01568	0.01311	0.21931	-0.40936
wmq37	0.42558	-0.35956	0.37242	0.31607	0.12502
wmq7	0.42340	0.25827	0.31548	0.20935	-0.08295
wmq41	0.40619	0.14674	0.25805	-0.35104	0.36408
wmq9	0.39894	0.30732	-0.32567	0.18626	-0.10425
wmq15	0.39051	-0.18965	-0.20147	0.10216	0.32288
wmq12	0.34761	0.22218	0.00860	-0.08657	-0.17939
wmq8	0.34565	0.28551	0.22162	-0.22671	0.07291
wmq20	0.15650	0.69605	-0.17594	0.24423	0.04256
wmq29	0.46381	0.48910	-0.29355	0.16414	-0.05318
wmq25	0.30608	-0.36700	-0.20862	0.12057	0.36675
wmq18	0.17180	-0.54539	0.25068	0.03908	0.01335
wmq17	-0.25633	0.20067	0.55056	0.05553	0.00808
wmq40	0.14000	0.28946	0.46289	0.10334	-0.13373
wmq19	0.20685	0.01501	0.43339	-0.28251	0.08653
wmq45	0.38906	-0.39490	-0.07485	0.40850	0.19028
wmq4	0.04468	0.21970	0.29335	0.32240	0.19030
wmq1	0.14950	0.01554	-0.31118	-0.35080	0.24855
wmq3	0.20932	0.22969	-0.06228	0.23053	0.45158
wmq27	0.15208	0.14056	0.38706	0.00650	0.42601
wmq42	0.36144	-0.19208	0.17874	0.19524	-0.37040

Variance Explained by Each Factor

Factor1	Factor2	Factor3	Factor4	Factor5
5.7537845	2.6325641	2.3682670	1.8201044	1.7843255

Final Communality Estimates: Total = 14.359046

wmq1	wmq3	wmq4	wmq6	wmq7	wmq8
0.30426022	0.35751903	0.27647004	0.42017576	0.39620689	0.30681790
wmq9	wmq11	wmq12	wmq13	wmq14	wmq15
0.40522603	0.41083705	0.20994391	0.58806952	0.34439427	0.34373968
wmq17	wmq18	wmq19	wmq20	wmq21	wmq23
0.41223426	0.39151117	0.31813721	0.60139431	0.32956350	0.35327408
wmq24	wmq25	wmq27	wmq29	wmq31	wmq33
0.55462570	0.42093589	0.37422737	0.57027516	0.51147750	0.55061077
wmq34	wmq35	wmq37	wmq38	wmq40	wmq41
0.45528265	0.46450683	0.56462336	0.36749020	0.34621140	0.50889599
wmq42	wmq45	wmq46	wmq47		
0.37479361	0.51599378	0.46856457	0.54075594		

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 Five Principal Components
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The FACTOR Procedure
 Rotation Method: Varimax

Orthogonal Transformation Matrix

	1	2	3	4	5
1	0.45212	0.51361	0.49893	0.43667	0.30363
2	0.74211	0.21319	-0.52331	-0.22579	-0.28103
3	-0.41280	0.56321	-0.26069	0.42179	-0.51626
4	0.26783	-0.53059	0.31449	0.41404	-0.61352
5	-0.05216	0.30336	0.55709	-0.63953	-0.43116

Rotated Factor Pattern

	Factor1	Factor2	Factor3	Factor4	Factor5
wmq29	0.74057	0.07393	0.07397	0.07025	0.07715
wmq20	0.72313	0.01300	-0.13979	-0.08912	-0.22546
wmq31	0.61277	0.02935	0.33341	0.05302	0.14543
wmq9	0.59820	-0.04346	0.12361	0.11124	0.13357
wmq14	0.49234	0.25663	0.07854	0.17194	0.02009
wmq3	0.32900	0.13607	0.32454	-0.18007	-0.30498
wmq12	0.30466	0.22226	-0.07224	0.18413	0.16912
wmq18	-0.42078	0.09646	0.32550	0.31154	0.04629
wmq41	0.07301	0.68195	0.15103	-0.12510	0.00727
wmq35	0.06822	0.56882	0.13785	0.34231	0.01118
wmq19	-0.15441	0.52968	-0.05827	0.09743	-0.02914
wmq46	0.14930	0.52658	0.32447	-0.20143	0.15210
wmq8	0.21215	0.50562	-0.06541	0.03945	0.01795
wmq27	-0.00719	0.45185	0.14079	-0.07182	-0.38082
wmq23	-0.01744	0.43882	0.17749	0.10962	0.34189
wmq21	0.35420	0.41848	-0.00408	0.16980	0.01137
wmq45	0.01322	-0.08554	0.65475	0.27494	-0.06491
wmq25	-0.03469	0.00876	0.64138	-0.05610	0.07168
wmq15	0.12950	0.09041	0.55860	-0.03583	0.07399
wmq34	-0.01091	0.21762	0.48331	0.26093	0.32579
wmq38	0.10190	0.07840	0.47628	0.35191	0.01670
wmq47	0.29121	0.26982	0.46223	0.16827	0.37574
wmq42	0.01870	0.02940	0.08930	0.59431	0.11136
wmq6	0.06701	0.04093	0.31726	0.55968	0.01060
wmq11	0.26256	-0.00985	0.06588	0.55437	0.17358
wmq24	0.08861	0.40924	-0.08091	0.48335	0.37299
wmq37	-0.15002	0.22189	0.47245	0.47502	-0.20982
wmq7	0.31326	0.31396	0.01348	0.39937	-0.19957
wmq40	0.12168	0.29891	-0.24430	0.31933	-0.28355
wmq1	0.10066	0.16637	0.17572	-0.37368	0.30973
wmq13	0.15402	0.27928	0.05093	0.21372	0.66187
wmq33	0.31127	0.18036	0.27992	0.20788	0.54737
wmq17	-0.17979	0.19419	-0.35446	0.09281	-0.45600
wmq4	0.13857	0.12166	0.03825	0.10542	-0.47947

Variance Explained by Each Factor

Factor1	Factor2	Factor3	Factor4	Factor5
3.1649497	3.0652906	3.0479498	2.6944932	2.3863623

Final Communalities Estimates: Total = 14.359046

wmq1	wmq3	wmq4	wmq6	wmq7	wmq8
0.30426022	0.35751903	0.27647004	0.42017576	0.39620689	0.30681790
wmq9	wmq11	wmq12	wmq13	wmq14	wmq15
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wmq42	wmq45	wmq46	wmq47		
0.37479361	0.51599378	0.46856457	0.54075594		
