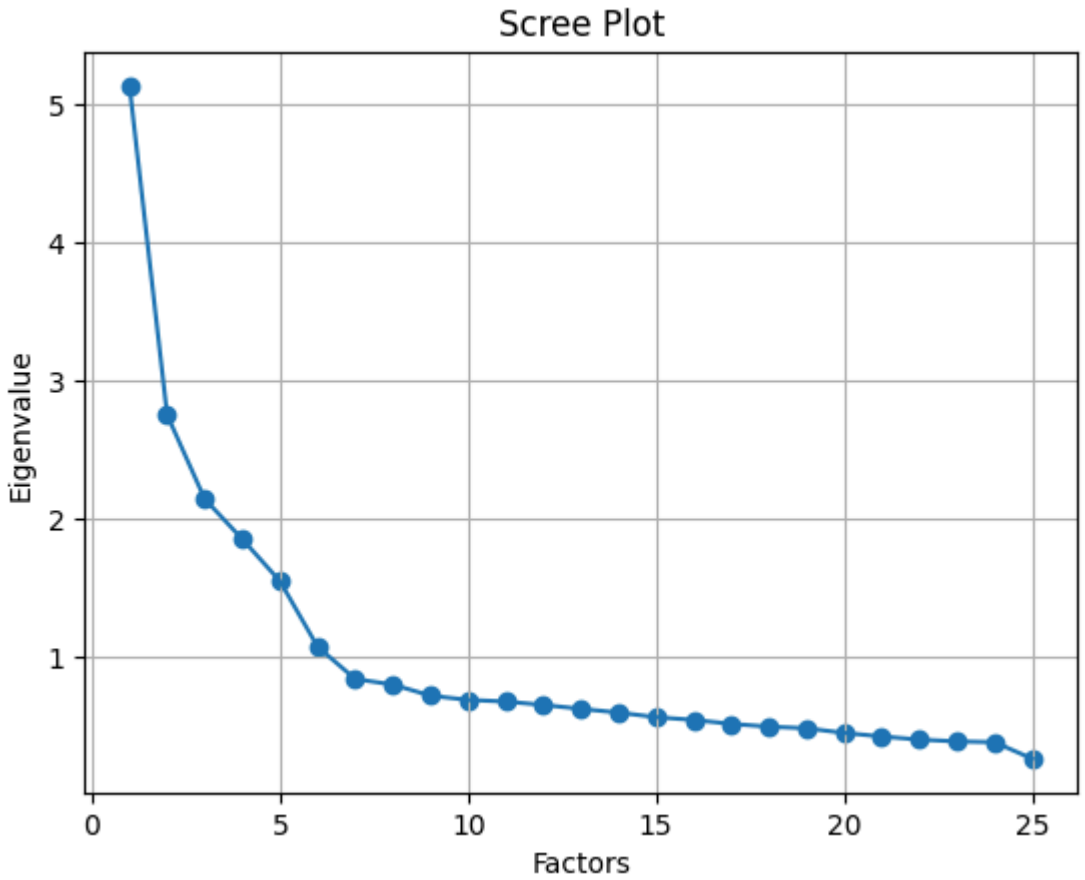
In [3]:

```
import pandas as pd
from factor_analyzer import FactorAnalyzer
import matplotlib.pyplot as plt
import seaborn as sns

df = pd.read_csv('bfi.csv', index_col=0)
# df.columns

df.drop(['gender', 'education', 'age'],axis=1,inplace=True)
df.dropna(inplace=True)
# df.info()

from factor_analyzer.factor_analyzer import calculate_bartlett_sphericity
chi_square_value,p_value=calculate_bartlett_sphericity(df)
print(chi_square_value, p_value)

from factor_analyzer.factor_analyzer import calculate_kmo
kmo_all,kmo_model=calculate_kmo(df)
print(kmo_model)

fa = FactorAnalyzer(n_factors=25,rotation=None)
fa.fit(df)
#Eigen값 체크
ev, v = fa.get_eigenvalues()
plt.scatter(range(1,df.shape[1]+1),ev)
plt.plot(range(1,df.shape[1]+1),ev)
plt.title('Scree Plot')
plt.xlabel('Factors')
plt.ylabel('Eigenvalue')
plt.grid()
plt.show()

fa = FactorAnalyzer(n_factors=6, rotation="varimax") #ml : 최대우도 방법
fa.fit(df)
efa_result= pd.DataFrame(fa.loadings_, index=df.columns)

plt.figure(figsize=(6,10))
sns.heatmap(efa_result, cmap="Blues", annot=True, fmt='.2f')
plt.show()

efa_result= pd.DataFrame(fa.rotation_matrix_)

plt.figure(figsize=(6,10))
```

```
sns.heatmap(efa_result, cmap="Blues", annot=True, fmt='.2f')
plt.show()
```

```
18146.065577235047 0.0
0.8486452309468394
```

```
/opt/homebrew/Caskroom/miniforge/base/envs/general/lib/python3.11/site-packages/sklearn/utils/deprecation.py:151: FutureWarning:
'force_all_finite' was renamed to 'ensure_all_finite' in 1.6 and will be removed in 1.8.
  warnings.warn(
```




```
/opt/homebrew/Caskroom/miniforge/base/envs/general/lib/python3.11/site-packages/sklearn/utils/deprecation.py:151: FutureWarning:
'force_all_finite' was renamed to 'ensure_all_finite' in 1.6 and will be removed in 1.8.
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```
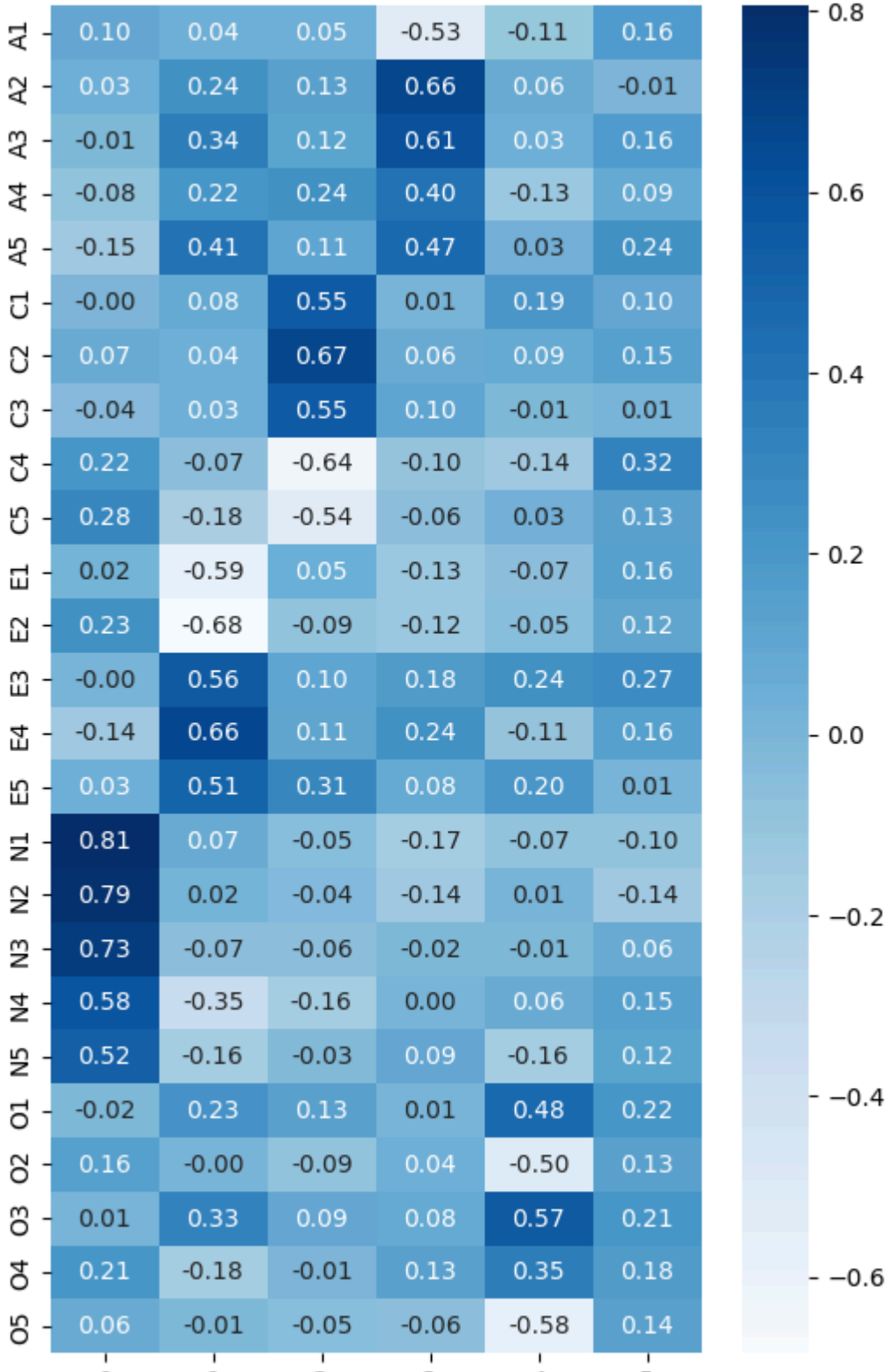
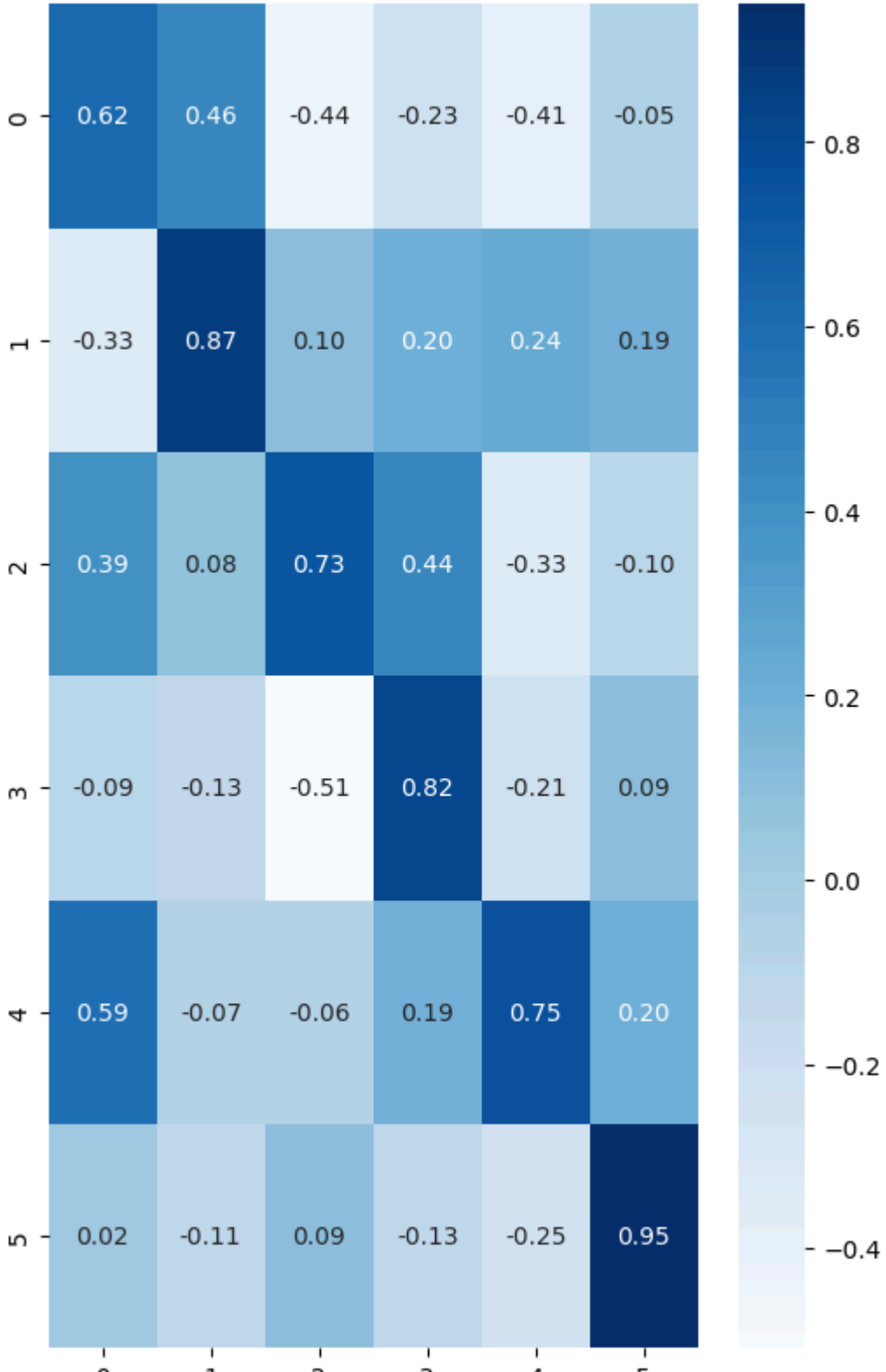


A1 0.10 0.04 0.05 -0.53 -0.11 0.16
A2 0.03 0.24 0.13 0.66 0.06 -0.01
A3 -0.01 0.34 0.12 0.61 0.03 0.16
A4 -0.08 0.22 0.24 0.40 -0.13 0.09
A5 -0.15 0.41 0.11 0.47 0.03 0.24
C1 -0.00 0.08 0.55 0.01 0.19 0.10
C2 0.07 0.04 0.67 0.06 0.09 0.15
C3 -0.04 0.03 0.55 0.10 -0.01 0.01
C4 0.22 -0.07 -0.64 -0.10 -0.14 0.32
C5 0.28 -0.18 -0.54 -0.06 0.03 0.13
E1 0.02 -0.59 0.05 -0.13 -0.07 0.16
E2 0.23 -0.68 -0.09 -0.12 -0.05 0.12
E3 -0.00 0.56 0.10 0.18 0.24 0.27
E4 -0.14 0.66 0.11 0.24 -0.11 0.16
E5 0.03 0.51 0.31 0.08 0.20 0.01
N1 0.81 0.07 -0.05 -0.17 -0.07 -0.10
N2 0.79 0.02 -0.04 -0.14 0.01 -0.14
N3 0.73 -0.07 -0.06 -0.02 -0.01 0.06
N4 0.58 -0.35 -0.16 0.00 0.06 0.15
N5 0.52 -0.16 -0.03 0.09 -0.16 0.12
O1 -0.02 0.23 0.13 0.01 0.48 0.22
O2 0.16 -0.00 -0.09 0.04 -0.50 0.13
O3 0.01 0.33 0.09 0.08 0.57 0.21
O4 0.21 -0.18 -0.01 0.13 0.35 0.18
O5 0.06 -0.01 -0.05 -0.06 -0.58 0.14
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
−0.6

0
1
2
3
4
5


0
1
2
3
4
5
0.62
0.46
-0.44
-0.23
-0.41
-0.05
-0.33
0.87
0.10
0.20
0.24
0.19
0.39
0.08
0.73
0.44
-0.33
-0.10
-0.09
-0.13
-0.51
0.82
-0.21
0.09
0.59
-0.07
-0.06
0.19
0.75
0.20
0.02
-0.11
0.09
-0.13
-0.25
0.95
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4

0 1 2 3 4 5

In [ ]: