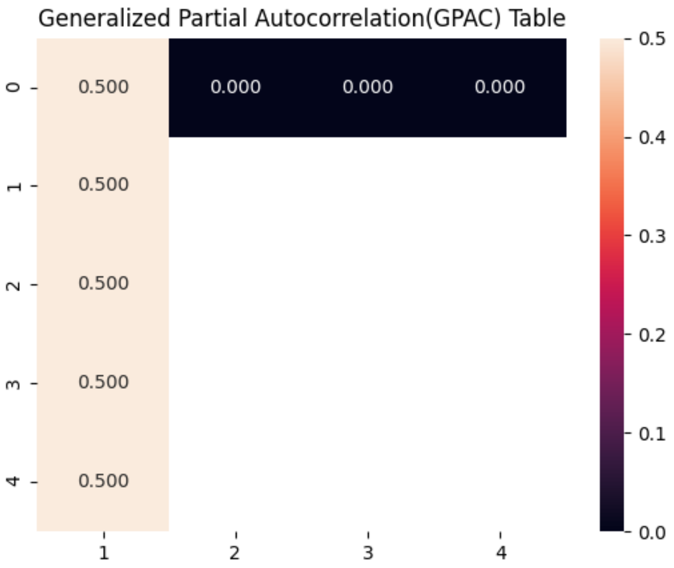
Bradley Reardon

Time Series Forecasting and Analysis

HW8

1. Example 1

   - All coefficients are not statistically important because the p-values do not fall between the confidence intervals

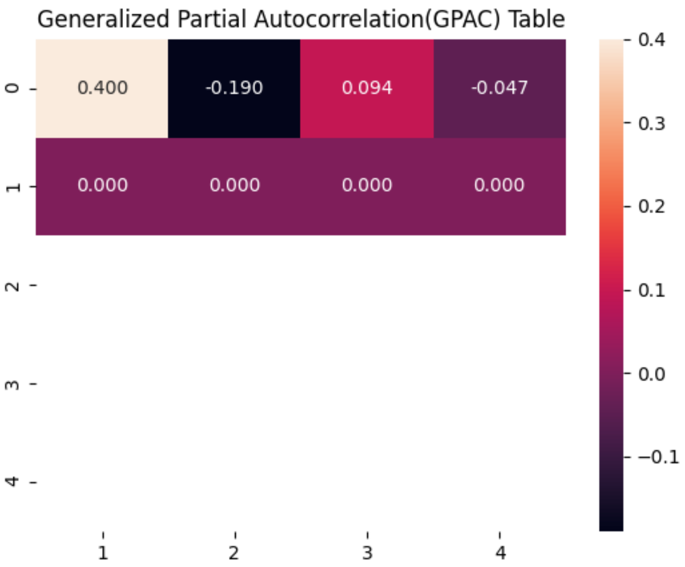


Generalized Partial Autocorrelation(GPAC) Table

	1	2	3	4
0	0.500	0.000	0.000	0.000
1	0.500			
2	0.500			
3	0.500			
4	0.500			

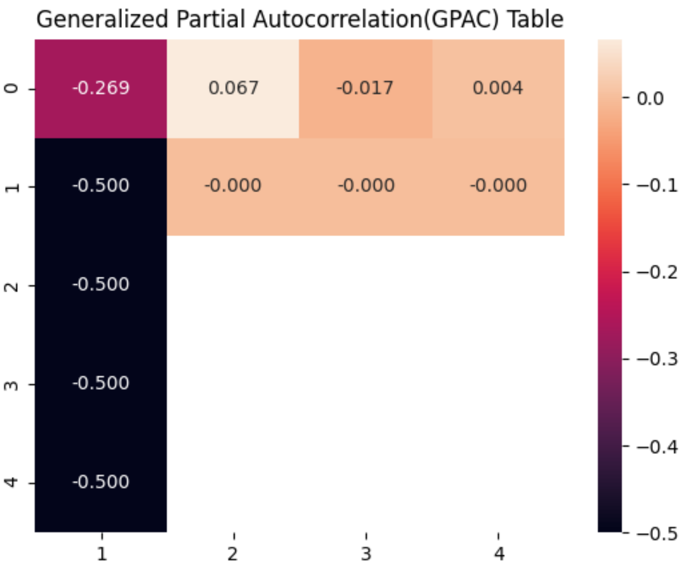
2. Example 2

   - All coefficients are not statistically important because the p-values do not fall between the confidence intervals



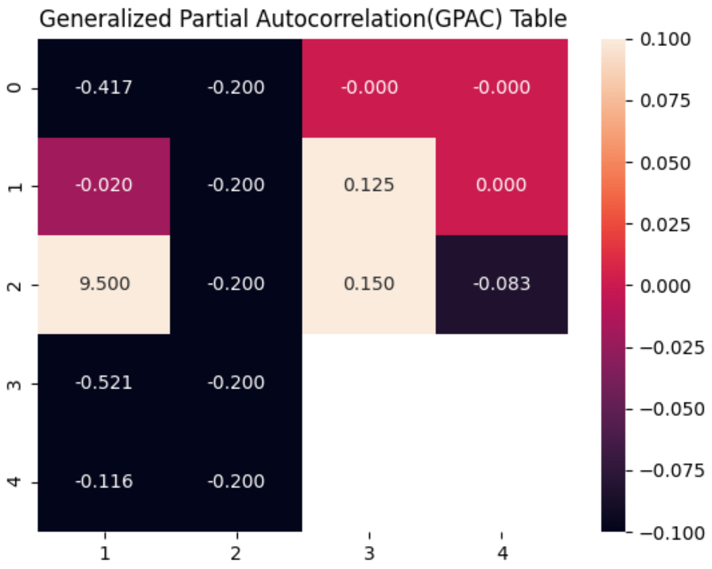
3. Example 3

- All coefficients are not statistically important because the p-values do not fall between the confidence intervals



4. Example 4

- All coefficients are not statistically important because the p-values do not fall between the confidence intervals

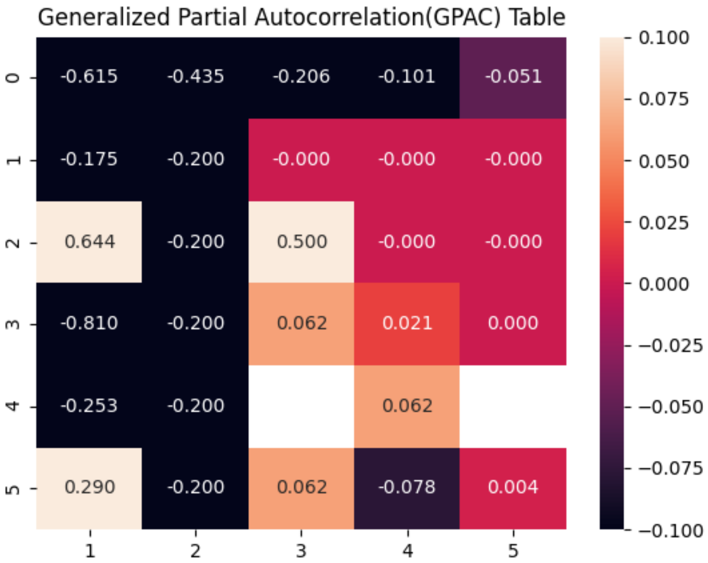


Generalized Partial Autocorrelation(GPAC) Table

	1	2	3	4
0	-0.417	-0.200	-0.000	-0.000
1	-0.020	-0.200	0.125	0.000
2	9.500	-0.200	0.150	-0.083
3	-0.521	-0.200		
4	-0.116	-0.200		

5. Example 5

- All coefficients are not statistically important because the p-values do not fall between the confidence intervals

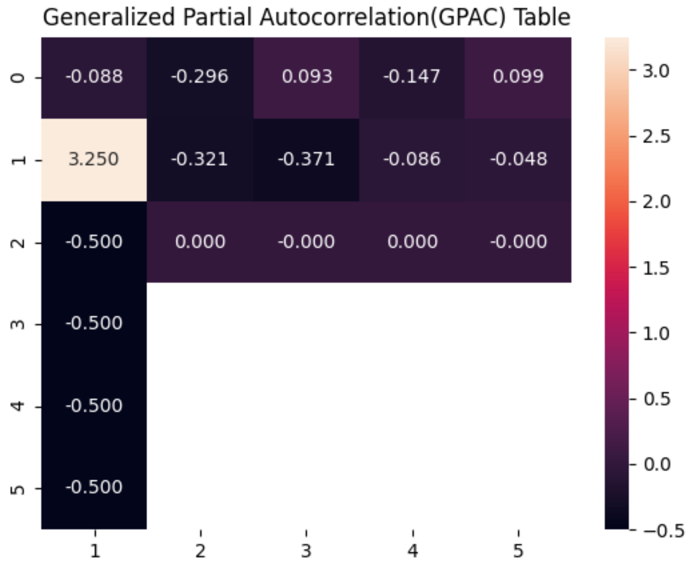


Generalized Partial Autocorrelation(GPAC) Table

	1	2	3	4	5
0	-0.615	-0.435	-0.206	-0.101	-0.051
1	-0.175	-0.200	-0.000	-0.000	-0.000
2	0.644	-0.200	0.500	-0.000	-0.000
3	-0.810	-0.200	0.062	0.021	0.000
4	-0.253	-0.200		0.062	
5	0.290	-0.200	0.062	-0.078	0.004

6. Example 6

- The residual is white
- The variance of error is:0.9877513214934179
- All coefficients are not statistically important because the p-values do not fall between the confidence intervals

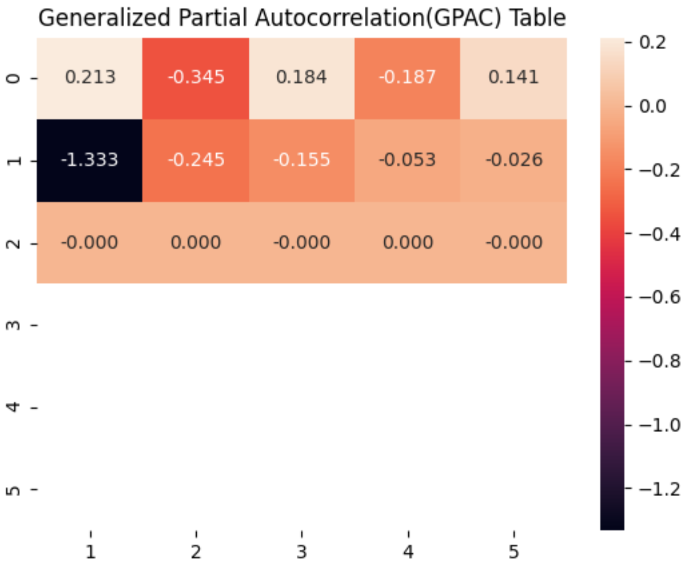


Generalized Partial Autocorrelation(GPAC) Table

	1	2	3	4	5
0	-0.088	-0.296	0.093	-0.147	0.099
1	3.250	-0.321	-0.371	-0.086	-0.048
2	-0.500	0.000	-0.000	0.000	-0.000
3	-0.500				
4	-0.500				
5	-0.500				

7. Example 7

- All coefficients are not statistically important because the p-values do not fall between the confidence intervals

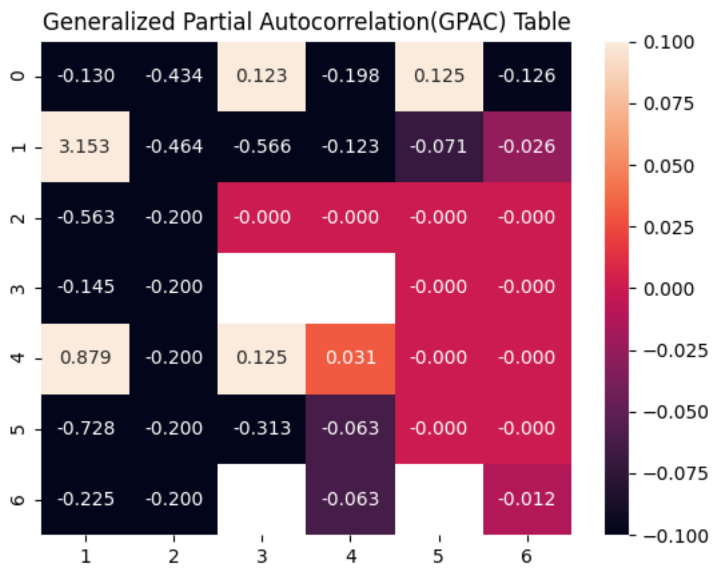


Generalized Partial Autocorrelation(GPAC) Table

	1	2	3	4	5
0	0.213	-0.345	0.184	-0.187	0.141
1	-1.333	-0.245	-0.155	-0.053	-0.026
2	-0.000	0.000	-0.000	0.000	-0.000
3					
4					
5					

8. Example 8

- All coefficients are not statistically important because the p-values do not fall between the confidence intervals


Generalized Partial Autocorrelation(GPAC) Table

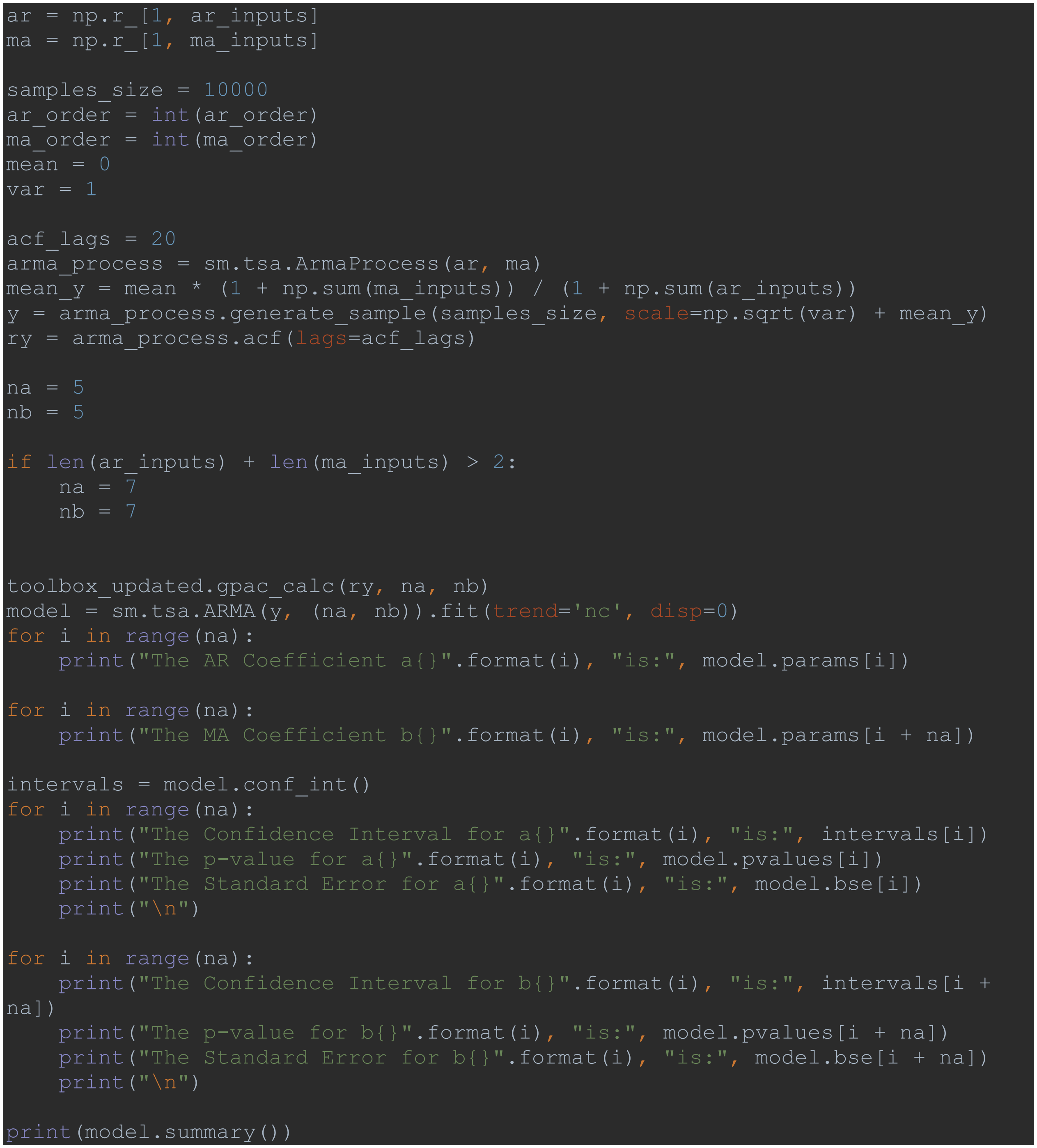
```
import statsmodels.api as sm
import numpy as np
import pandas as pd
import matplotlib

import toolbox_updated


ar_order = input("Enter AR order: ")
ma_order = input("Enter MA order: ")

ar_inputs = []
if int(ar_order) > 0:
    for i in range(int(ar_order)):
        text = "Enter a" + str(i + 1) + ": "
        input_value = input(text)
        ar_inputs.append(float(input_value))

ma_inputs = []
if int(ma_order) > 0:
    for i in range(int(ma_order)):
        text = "Enter b" + str(i + 1) + ": "
        input_value = input(text)
        ma_inputs.append(float(input_value))
```



```
ar = np.r_[1, ar_inputs]
ma = np.r_[1, ma_inputs]

samples_size = 10000
ar_order = int(ar_order)
ma_order = int(ma_order)
mean = 0
var = 1

acf_lags = 20
arma_process = sm.tsa.ArmaProcess(ar, ma)
mean_y = mean * (1 + np.sum(ma_inputs)) / (1 + np.sum(ar_inputs))
y = arma_process.generate_sample(samples_size, scale=np.sqrt(var) + mean_y)
ry = arma_process.acf(lags=acf_lags)

na = 5
nb = 5

if len(ar_inputs) + len(ma_inputs) > 2:
    na = 7
    nb = 7


toolbox_updated.gpac_calc(ry, na, nb)
model = sm.tsa.ARMA(y, (na, nb)).fit(trend='nc', disp=0)
for i in range(na):
    print("The AR Coefficient a{}".format(i), "is:", model.params[i])

for i in range(na):
    print("The MA Coefficient b{}".format(i), "is:", model.params[i + na])

intervals = model.conf_int()
for i in range(na):
    print("The Confidence Interval for a{}".format(i), "is:", intervals[i])
    print("The p-value for a{}".format(i), "is:", model.pvalues[i])
    print("The Standard Error for a{}".format(i), "is:", model.bse[i])
    print("\n")

for i in range(na):
    print("The Confidence Interval for b{}".format(i), "is:", intervals[i +
na])
    print("The p-value for b{}".format(i), "is:", model.pvalues[i + na])
    print("The Standard Error for b{}".format(i), "is:", model.bse[i + na])
    print("\n")

print(model.summary())
```