

## q1.5a

First, we aggregate the data on a weekly basis

*#Step 2 Aggregate the data by week*

```
weekly = apply.weekly(tsddata[,1:18], sum)
```

```
weekly = apply.weekly(tsddata, function(d){  
  c(Hobbies_CA_1 = sum(d$Hobbies_CA_1),  
    Hobbies_CA_2 = sum(d$Hobbies_CA_2),  
    Hobbies_CA_3 = sum(d$Hobbies_CA_3),  
    Household_1_CA_1 = sum(d$Household_1_CA_1),  
    Household_1_CA_2 = sum(d$Household_1_CA_2),  
    Household_1_CA_3 = sum(d$Household_1_CA_3),  
    Household_2_CA_1 = sum(d$Household_2_CA_1),  
    Household_2_CA_2 = sum(d$Household_2_CA_2),  
    Household_2_CA_3 = sum(d$Household_2_CA_3),  
    Foods_1_CA_1 = sum(d$Foods_1_CA_1),  
    Foods_1_CA_2 = sum(d$Foods_1_CA_2),  
    Foods_1_CA_3 = sum(d$Foods_1_CA_3),  
    Foods_2_CA_1 = sum(d$Foods_2_CA_1),  
    Foods_2_CA_2 = sum(d$Foods_2_CA_2),  
    Foods_2_CA_3 = sum(d$Foods_2_CA_3),  
    Foods_3_CA_1 = sum(d$Foods_3_CA_1),  
    Foods_3_CA_2 = sum(d$Foods_3_CA_2),  
    Foods_3_CA_3 = sum(d$Foods_3_CA_3)  
  })  
})
```

As for the previous questions, we split the time series in three different splits: - 70-30 - 80-20 - 90-10 #Step 3  
perform training and testing data split split: 70-30

```
train1 <- head(weekly, 198)  
test1 <- tail(weekly, 84)
```

split: 80-20

```
train2 <- head(weekly, 226)  
test2 <- tail(weekly, 56)
```

split: 90-10

```
train3 <- head(weekly, 254)  
test3 <- tail(weekly, 28)
```

For each product, we compute a series of key statistics to assess the accuracy of the forecast methods. The choice of the best method is based on the RMSSE statistics.

###Split1

Let's analyze the forecast for the Hobbies products

[Store 1 - Train Split 1]

##		Naive	sNaive	MA	ES	ESX
## MAE	1.340000e+02	1.265000e+02	1.270000e+02	1.270000e+02	1.270000e+02	
## MAPE	5.939561e-02	5.561838e-02	5.671993e-02	5.791550e-02	5.791536e-02	
## MSE	2.613550e+04	2.179150e+04	2.589577e+04	2.818373e+04	2.818317e+04	
## RMSE	1.616648e+02	1.476194e+02	1.609216e+02	1.678801e+02	1.678784e+02	
## RMSSE	2.286285e+02	2.087654e+02	2.275776e+02	2.374183e+02	2.374160e+02	
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.297569e+02	1.263809e+02	1.308668e+02	1.331854e+02		1.270000e+02
## MAPE	5.882444e-02	5.754506e-02	6.052390e-02	6.015970e-02		5.783496e-02
## MSE	2.726229e+04	2.775113e+04	3.235765e+04	2.836375e+04		2.788142e+04
## RMSE	1.651130e+02	1.665867e+02	1.798823e+02	1.684154e+02		1.669773e+02
## RMSSE	2.335050e+02	2.355892e+02	2.543920e+02	2.381754e+02		2.361415e+02

According to the results, the most accurate method is sNaive.

[Store 2 - Train Split 1]

##		Naive	sNaive	MA	ES	ESX
## MAE	8.075000e+01	9.750000e+01	8.150000e+01	8.932456e+01	8.853208e+01	
## MAPE	5.977045e-02	7.169663e-02	5.936857e-02	6.703735e-02	6.636572e-02	
## MSE	1.178925e+04	1.390300e+04	1.262175e+04	1.183468e+04	1.180581e+04	
## RMSE	1.085783e+02	1.179110e+02	1.123466e+02	1.087873e+02	1.086546e+02	
## RMSSE	1.535529e+02	1.667513e+02	1.588820e+02	1.538485e+02	1.536607e+02	
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	9.802275e+01	1.080761e+02	1.012366e+02	1.065351e+02		8.734720e+01
## MAPE	7.569920e-02	8.370875e-02	7.758453e-02	8.192348e-02		6.536155e-02
## MSE	1.431703e+04	1.441379e+04	1.311503e+04	1.379684e+04		1.177202e+04
## RMSE	1.196538e+02	1.200574e+02	1.145209e+02	1.174600e+02		1.084990e+02
## RMSSE	1.692160e+02	1.697869e+02	1.619569e+02	1.661135e+02		1.534407e+02

According to the results, the most accurate methods is Naive.

[Store 3 - Train Split 1]

##		Naive	sNaive	MA	ES	ESX
## MAE	1.795000e+02	2.727500e+02	2.025000e+02	1.982213e+02	1.982227e+02	
## MAPE	6.608332e-02	9.660137e-02	7.323494e-02	7.190451e-02	7.190495e-02	
## MSE	4.853950e+04	8.723925e+04	5.166750e+04	5.076518e+04	5.076545e+04	
## RMSE	2.203168e+02	2.953629e+02	2.273049e+02	2.253113e+02	2.253119e+02	
## RMSSE	3.115750e+02	4.177062e+02	3.214576e+02	3.186383e+02	3.186391e+02	
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.969460e+02	1.969460e+02	1.872884e+02	1.582379e+02		2.163278e+02
## MAPE	7.145369e-02	7.145369e-02	6.845935e-02	6.007402e-02		7.725041e-02
## MSE	5.001600e+04	5.001600e+04	4.803112e+04	4.926056e+04		5.734239e+04
## RMSE	2.236426e+02	2.236426e+02	2.191600e+02	2.219472e+02		2.394627e+02
## RMSSE	3.162784e+02	3.162784e+02	3.099391e+02	3.138808e+02		3.386514e+02

According to the results, the most accurate method is SARIMAX.

Household\_1 products [Store 1 - Train Split 1]

##		Naive	sNaive	MA	ES	ESX
## MAE	1.085000e+02	182.500000	1.265000e+02	1.315057e+02	1.290870e+02	
## MAPE	7.095881e-02	0.120238	8.386993e-02	8.731001e-02	8.572556e-02	
## MSE	1.195500e+04	56271.000000	1.721100e+04	1.886598e+04	1.817945e+04	
## RMSE	1.093389e+02	237.215092	1.311907e+02	1.373535e+02	1.348312e+02	
## RMSSE	1.546286e+02	335.472801	1.855317e+02	1.942472e+02	1.906801e+02	
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model

## MAE	1.377693e+02	1.377693e+02	1.495352e+02	1.087992e+02	1.316295e+02
## MAPE	9.223838e-02	9.223838e-02	1.008905e-01	6.981738e-02	8.743488e-02
## MSE	2.267893e+04	2.267893e+04	2.985173e+04	1.405549e+04	1.896513e+04
## RMSE	1.505953e+02	1.505953e+02	1.727765e+02	1.185559e+02	1.377139e+02
## RMSSE	2.129738e+02	2.129738e+02	2.443429e+02	1.676633e+02	1.947569e+02

According to the results, the most accurate method is Naive.

Household\_1 products [Store 2 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	9.925000e+01	8.200000e+01	1.075833e+02	1.082721e+02	1.082723e+02
## MAPE	9.120816e-02	7.768144e-02	9.960839e-02	1.003027e-01	1.003029e-01
## MSE	1.081075e+04	1.314950e+04	1.311353e+04	1.332872e+04	1.332879e+04
## RMSE	1.039748e+02	1.146713e+02	1.145143e+02	1.154501e+02	1.154504e+02
## RMSSE	1.470425e+02	1.621697e+02	1.619477e+02	1.632711e+02	1.632715e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.054239e+02	1.054239e+02	1.058930e+02	9.973601e+01	1.096254e+02
## MAPE	9.745045e-02	9.745045e-02	9.794736e-02	9.008437e-02	1.017474e-01
## MSE	1.248384e+04	1.248384e+04	1.264321e+04	1.042005e+04	1.386120e+04
## RMSE	1.117311e+02	1.117311e+02	1.124420e+02	1.020786e+02	1.177336e+02
## RMSSE	1.580116e+02	1.580116e+02	1.590170e+02	1.443610e+02	1.665005e+02

According to the results, the most accurate method is Holt-Winters.

Household\_1 products [Store 3 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	4.262500e+02	3.997500e+02	2.602500e+02	3.004059e+02	3.021859e+02
## MAPE	1.654180e-01	1.554980e-01	1.017801e-01	1.171743e-01	1.178567e-01
## MSE	1.956658e+05	1.840762e+05	8.170675e+04	1.042204e+05	1.052930e+05
## RMSE	4.423412e+02	4.290411e+02	2.858439e+02	3.228318e+02	3.244889e+02
## RMSSE	6.255649e+02	6.067557e+02	4.042444e+02	4.565531e+02	4.588966e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	3.559349e+02	3.559349e+02	4.142579e+02	3.976873e+02	2.605241e+02
## MAPE	1.383902e-01	1.383902e-01	1.606391e-01	1.542105e-01	1.019719e-01
## MSE	1.396668e+05	1.396668e+05	1.832578e+05	1.693584e+05	8.326602e+04
## RMSE	3.737202e+02	3.737202e+02	4.280862e+02	4.115317e+02	2.885585e+02
## RMSSE	5.285202e+02	5.285202e+02	6.054053e+02	5.819938e+02	4.080834e+02

According to the results, the most accurate method is MA.

Household\_2 products [Store 1 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	4.725000e+01	7.075000e+01	4.725000e+01	47.2500000	4.725000e+01
## MAPE	6.294342e-02	9.554542e-02	6.145461e-02	0.0627026	6.270262e-02
## MSE	2.513250e+03	5.786250e+03	2.828250e+03	2520.2711074	2.520270e+03
## RMSE	5.013232e+01	7.606740e+01	5.318129e+01	50.2023018	5.020229e+01
## RMSSE	7.089781e+01	1.075756e+02	7.520971e+01	70.9967761	7.099676e+01
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	4.714348e+01	4.714348e+01	4.698568e+01	5.098937e+01	5.039532e+01
## MAPE	6.233769e-02	6.233769e-02	6.343757e-02	6.484656e-02	6.489288e-02
## MSE	2.537282e+03	2.537282e+03	2.588340e+03	3.941844e+03	3.311729e+03
## RMSE	5.037144e+01	5.037144e+01	5.087573e+01	6.278410e+01	5.754762e+01
## RMSSE	7.123597e+01	7.123597e+01	7.194914e+01	8.879013e+01	8.138463e+01

According to the results, the most accurate method is Naive.

Household\_2 products [Store 2 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	7.175000e+01	9.550000e+01	7.158333e+01	7.726012e+01	7.726002e+01
## MAPE	7.792314e-02	1.040621e-01	7.772716e-02	8.440213e-02	8.440201e-02
## MSE	5.762250e+03	1.420650e+04	5.733194e+03	6.847967e+03	6.847944e+03
## RMSE	7.590949e+01	1.191910e+02	7.571786e+01	8.275244e+01	8.275231e+01
## RMSSE	1.073522e+02	1.685616e+02	1.070812e+02	1.170296e+02	1.170294e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	7.724501e+01	7.724501e+01	4.923244e+01	6.905779e+01	7.664664e+01
## MAPE	8.438085e-02	8.438085e-02	5.179967e-02	7.514816e-02	8.368078e-02
## MSE	6.842537e+03	6.842537e+03	3.245118e+03	5.366294e+03	6.715071e+03
## RMSE	8.271963e+01	8.271963e+01	5.696594e+01	7.325500e+01	8.194554e+01
## RMSSE	1.169832e+02	1.169832e+02	8.056200e+01	1.035982e+02	1.158885e+02

According to the results, the most accurate method is Holt-Winters.

Household\_2 products [Store 3 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	1.777500e+02	2.302500e+02	1.597500e+02	1.571428e+02	1.571391e+02
## MAPE	1.541384e-01	1.984808e-01	1.387727e-01	1.365471e-01	1.365439e-01
## MSE	3.489725e+04	5.659625e+04	2.882225e+04	2.799605e+04	2.799487e+04
## RMSE	1.868081e+02	2.378997e+02	1.697712e+02	1.673202e+02	1.673167e+02
## RMSSE	2.641865e+02	3.364409e+02	2.400927e+02	2.366265e+02	2.366215e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.531795e+02	1.531795e+02	1.376360e+02	1.278391e+02	161.412674
## MAPE	1.331647e-01	1.331647e-01	1.198457e-01	1.114936e-01	0.140192
## MSE	2.676715e+04	2.676715e+04	2.210507e+04	1.954511e+04	29356.238913
## RMSE	1.636067e+02	1.636067e+02	1.486777e+02	1.398038e+02	171.336625
## RMSSE	2.313748e+02	2.313748e+02	2.102621e+02	1.977125e+02	242.306578

According to the results, the most accurate method is Holt-Winters.

Foods\_1 products [Store 1 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	3.462500e+02	1.710000e+02	1.187500e+02	1.413186e+02	1.413104e+02
## MAPE	3.615984e-01	1.745178e-01	1.346528e-01	1.483102e-01	1.483048e-01
## MSE	1.466322e+05	3.677250e+04	2.930861e+04	2.676707e+04	2.676691e+04
## RMSE	3.829259e+02	1.917616e+02	1.711976e+02	1.636065e+02	1.636060e+02
## RMSSE	5.415390e+02	2.711918e+02	2.421099e+02	2.313745e+02	2.313738e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.565257e+02	1.536261e+02	1.517238e+02	5.195736e+02	1.309884e+02
## MAPE	1.451329e-01	1.369624e-01	1.357098e-01	5.313427e-01	1.371378e-01
## MSE	2.854366e+04	3.302390e+04	3.234678e+04	3.080639e+05	2.498888e+04
## RMSE	1.689487e+02	1.817248e+02	1.798521e+02	5.550350e+02	1.580787e+02
## RMSSE	2.389295e+02	2.569977e+02	2.543493e+02	7.849381e+02	2.235571e+02

According to the results, the most accurate method is State-Space-Model.

Foods\_1 products [Store 2 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	53.0000000	9.325000e+01	1.020000e+02	70.5409760	70.541352
## MAPE	0.1965953	3.657304e-01	3.737598e-01	0.2490706	0.249072
## MSE	3292.0000000	1.102875e+04	1.217500e+04	6747.0293011	6747.082283
## RMSE	57.3759532	1.050179e+02	1.103404e+02	82.1403025	82.140625
## RMSSE	81.1418511	1.485177e+02	1.560449e+02	116.1639299	116.164386

##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	55.4899616	52.2563431	52.4319631	50.0265481	61.2108910
## MAPE	0.2051084	0.1954104	0.1959182	0.1902423	0.2197377
## MSE	3679.5953611	3225.4646214	3250.6425188	3133.4723843	4836.8937409
## RMSE	60.6596683	56.7931741	57.0144062	55.9774275	69.5477803
## RMSSE	85.7857256	80.3176770	80.6305466	79.1640371	98.3554141

According to the results, the most accurate method is Holt-Winters.

Foods\_1 products [Store 3 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	3.935000e+02	2.775000e+02	1.808000e+02	2.205482e+02	2.118388e+02
## MAPE	2.975107e-01	1.945222e-01	1.315427e-01	1.520346e-01	1.475445e-01
## MSE	1.960035e+05	9.620150e+04	4.219166e+04	5.361500e+04	5.003069e+04
## RMSE	4.427228e+02	3.101637e+02	2.054061e+02	2.315491e+02	2.236754e+02
## RMSSE	6.261046e+02	4.386377e+02	2.904881e+02	3.274599e+02	3.163248e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.036924e+02	1.015814e+02	1.467260e+02	6.404863e+02	1.339194e+02
## MAPE	7.808204e-02	7.725977e-02	9.597225e-02	4.719276e-01	9.232167e-02
## MSE	1.424337e+04	1.453147e+04	3.349423e+04	4.674868e+05	2.489616e+04
## RMSE	1.193456e+02	1.205465e+02	1.830143e+02	6.837300e+02	1.577852e+02
## RMSSE	1.687801e+02	1.704786e+02	2.588213e+02	9.669403e+02	2.231419e+02

According to the results, the most accurate method is ARIMA.

Foods\_2 products [Store 1 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	4.160000e+02	5.630000e+02	3.845000e+02	3.905966e+02	3.906054e+02
## MAPE	2.247943e-01	2.841894e-01	2.064856e-01	2.100291e-01	2.100342e-01
## MSE	2.584365e+05	3.530205e+05	2.106825e+05	2.193055e+05	2.193181e+05
## RMSE	5.083665e+02	5.941553e+02	4.590016e+02	4.683006e+02	4.683141e+02
## RMSSE	7.189388e+02	8.402625e+02	6.491263e+02	6.622771e+02	6.622962e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	3.522524e+02	3.861498e+02	3.559208e+02	4.343073e+02	3.724577e+02
## MAPE	1.897584e-01	2.059237e-01	1.880437e-01	2.348210e-01	1.983876e-01
## MSE	1.930750e+05	2.029381e+05	1.641141e+05	2.822937e+05	1.873809e+05
## RMSE	4.394030e+02	4.504866e+02	4.051100e+02	5.313131e+02	4.328751e+02
## RMSSE	6.214097e+02	6.370842e+02	5.729121e+02	7.513903e+02	6.121779e+02

According to the results, the most accurate method is SARIMAX.

Foods\_2 products [Store 2 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	1.342500e+02	1.462500e+02	1.142500e+02	1.142500e+02	1.142500e+02
## MAPE	1.511216e-01	1.364851e-01	1.267749e-01	1.238734e-01	1.238745e-01
## MSE	3.655425e+04	2.376725e+04	2.384803e+04	2.078279e+04	2.078377e+04
## RMSE	1.911917e+02	1.541663e+02	1.544281e+02	1.441624e+02	1.441658e+02
## RMSSE	2.703858e+02	2.180241e+02	2.183943e+02	2.038764e+02	2.038812e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.256566e+02	1.235708e+02	1.256780e+02	2.660411e+02	1.145409e+02
## MAPE	1.291716e-01	1.271516e-01	1.204452e-01	2.853427e-01	1.240723e-01
## MSE	1.874388e+04	1.879081e+04	1.978970e+04	1.013694e+05	2.037424e+04
## RMSE	1.369083e+02	1.370796e+02	1.406759e+02	3.183856e+02	1.427384e+02
## RMSSE	1.936175e+02	1.938598e+02	1.989457e+02	4.502653e+02	2.018625e+02

According to the results, the most accurate method are ARIMA and SARIMA.

Foods\_2 products [Store 3 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	5.895000e+02	6.677500e+02	4.960000e+02	5.325085e+02	5.325206e+02
## MAPE	2.151209e-01	2.322473e-01	1.833230e-01	1.957390e-01	1.957431e-01
## MSE	4.664115e+05	5.858012e+05	3.649172e+05	4.024665e+05	4.024795e+05
## RMSE	6.829433e+02	7.653765e+02	6.040838e+02	6.344025e+02	6.344127e+02
## RMSSE	9.658276e+02	1.082406e+03	8.543035e+02	8.971806e+02	8.971950e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	5.505279e+02	5.463901e+02	3.867897e+02	6.418647e+02	4.627657e+02
## MAPE	2.024243e-01	1.999648e-01	1.449160e-01	2.338108e-01	1.711598e-01
## MSE	4.305461e+05	4.092813e+05	2.503654e+05	5.459069e+05	3.195470e+05
## RMSE	6.561601e+02	6.397509e+02	5.003653e+02	7.388552e+02	5.652849e+02
## RMSSE	9.279505e+02	9.047445e+02	7.076234e+02	1.044899e+03	7.994335e+02

According to the results, the most accurate method is SARIMAX.

Foods\_3 products [Store 1 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	1.588750e+03	1.722500e+03	1.209150e+03	1.213805e+03	1.213792e+03
## MAPE	1.400712e-01	1.525291e-01	1.068195e-01	1.072272e-01	1.072261e-01
## MSE	2.640450e+06	3.801930e+06	1.578367e+06	1.589646e+06	1.589614e+06
## RMSE	1.624946e+03	1.949854e+03	1.256331e+03	1.260812e+03	1.260799e+03
## RMSSE	2.298021e+03	2.757510e+03	1.776720e+03	1.783057e+03	1.783039e+03
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	4.664402e+02	1.137126e+03	1.382667e+03	1.953489e+03	9.820370e+02
## MAPE	4.084614e-02	1.003705e-01	1.216935e-01	1.721196e-01	8.666206e-02
## MSE	3.357361e+05	1.398218e+06	2.063322e+06	3.987333e+06	1.080500e+06
## RMSE	5.794274e+02	1.182463e+03	1.436427e+03	1.996831e+03	1.039471e+03
## RMSSE	8.194340e+02	1.672255e+03	2.031414e+03	2.823945e+03	1.470034e+03

According to the results, the most accurate method is ARIMA.

Foods\_3 products [Store 2 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	4.300000e+01	6.095000e+02	1.237500e+02	4.557615e+01	4.559393e+01
## MAPE	7.336386e-03	1.039457e-01	2.104995e-02	7.781163e-03	7.784233e-03
## MSE	2.284500e+03	4.260525e+05	1.738831e+04	2.460463e+03	2.461862e+03
## RMSE	4.779644e+01	6.527270e+02	1.318648e+02	4.960306e+01	4.961715e+01
## RMSSE	6.759438e+01	9.230953e+02	1.864849e+02	7.014931e+01	7.016925e+01
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.113592e+02	7.565005e+01	5.682082e+01	6.100430e+01	5.485900e+01
## MAPE	1.901620e-02	1.286002e-02	9.681863e-03	1.045765e-02	9.383860e-03
## MSE	1.512021e+04	8.517553e+03	4.251107e+03	5.583492e+03	3.534865e+03
## RMSE	1.229643e+02	9.229059e+01	6.520051e+01	7.472277e+01	5.945473e+01
## RMSSE	1.738977e+02	1.305186e+02	9.220745e+01	1.056739e+02	8.408169e+01

According to the results, the most accurate method is Naive.

Foods\_3 products [Store 3 - Train Split 1]

##	Naive	sNaive	MA	ES	ESX
## MAE	2.209250e+03	2.562000e+03	1.350250e+03	1.701026e+03	1.700944e+03
## MAPE	1.423089e-01	1.657085e-01	8.723544e-02	1.097249e-01	1.097196e-01
## MSE	5.043457e+06	8.522466e+06	1.985846e+06	3.056160e+06	3.055882e+06
## RMSE	2.245764e+03	2.919326e+03	1.409201e+03	1.748188e+03	1.748108e+03
## RMSSE	3.175990e+03	4.128551e+03	1.992911e+03	2.472311e+03	2.472198e+03

##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.148272e+03	1.167175e+03	1.487307e+03	2.576027e+03	9.153529e+02
## MAPE	7.365139e-02	7.498643e-02	9.547257e-02	1.659315e-01	5.890870e-02
## MSE	1.724128e+06	1.516374e+06	2.421018e+06	6.879152e+06	9.959774e+05
## RMSE	1.313060e+03	1.231411e+03	1.555962e+03	2.622814e+03	9.979867e+02
## RMSSE	1.856948e+03	1.741479e+03	2.200463e+03	3.709219e+03	1.411366e+03

According to the results, the most accurate method is State-Space Model.

###SPLIT 2

Let's analyze the forecast for the Hobbies products [Store 1 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	2.787500e+02	7.650000e+01	1.277500e+02	1.389241e+02	1.389317e+02
## MAPE	1.153285e-01	3.277289e-02	5.385625e-02	5.863527e-02	5.863852e-02
## MSE	9.396975e+04	1.393950e+04	2.787825e+04	3.319371e+04	3.319767e+04
## RMSE	3.065449e+02	1.180657e+02	1.669678e+02	1.821914e+02	1.822023e+02
## RMSSE	4.335199e+02	1.669701e+02	2.361281e+02	2.576576e+02	2.576729e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.316064e+02	1.362007e+02	1.631380e+02	4.023923e+02	1.363154e+02
## MAPE	5.55530e-02	5.753702e-02	6.860506e-02	1.662272e-01	5.751958e-02
## MSE	2.991861e+04	3.246192e+04	4.269200e+04	1.952674e+05	3.186341e+04
## RMSE	1.729700e+02	1.801719e+02	2.066204e+02	4.418907e+02	1.785032e+02
## RMSSE	2.446165e+02	2.548016e+02	2.922054e+02	6.249279e+02	2.524417e+02

According to the results, the most accurate method is sNaive.

[Store 2 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	191.250000	2.740000e+02	2.117500e+02	2.106096e+02	2.108773e+02
## MAPE	0.107814	1.570290e-01	1.201469e-01	1.194609e-01	1.196219e-01
## MSE	56732.250000	1.036995e+05	6.499375e+04	6.451209e+04	6.462492e+04
## RMSE	238.185327	3.220241e+02	2.549387e+02	2.539923e+02	2.542143e+02
## RMSSE	336.844920	4.554108e+02	3.605378e+02	3.591994e+02	3.595133e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.898110e+02	208.937253	2.316196e+02	1.894007e+02	2.115834e+02
## MAPE	1.073182e-01	0.118587	1.321524e-01	1.067996e-01	1.200467e-01
## MSE	5.418158e+04	63101.600908	7.361137e+04	5.542912e+04	6.492321e+04
## RMSE	2.327694e+02	251.200320	2.713141e+02	2.354339e+02	2.548003e+02
## RMSSE	3.291856e+02	355.250900	3.836961e+02	3.329538e+02	3.603421e+02

According to the results, the most accurate methods is ARIMA.

[Store 3 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	1.087500e+02	1.907500e+02	1.215500e+02	1.320654e+02	1.320642e+02
## MAPE	3.287501e-02	5.809360e-02	3.680367e-02	4.003111e-02	4.003077e-02
## MSE	1.717475e+04	5.970175e+04	2.012259e+04	2.278945e+04	2.278915e+04
## RMSE	1.310525e+02	2.443394e+02	1.418541e+02	1.509617e+02	1.509608e+02
## RMSSE	1.853362e+02	3.455481e+02	2.006120e+02	2.134921e+02	2.134908e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.311175e+02	1.311175e+02	1.189451e+02	8.783231e+01	1.607592e+02
## MAPE	3.973725e-02	3.973725e-02	3.599116e-02	2.639222e-02	4.887732e-02
## MSE	2.261439e+04	2.261439e+04	1.978833e+04	1.448726e+04	3.039344e+04
## RMSE	1.503808e+02	1.503808e+02	1.406710e+02	1.203631e+02	1.743372e+02
## RMSSE	2.126706e+02	2.126706e+02	1.989388e+02	1.702191e+02	2.465500e+02

According to the results, the most accurate method is Holt-Winters.

Household\_1 products [Store 1 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	8.175000e+01	7.750000e+01	6.935000e+01	7.982748e+01	7.306642e+01
## MAPE	4.736075e-02	4.560128e-02	4.019918e-02	4.622744e-02	4.228973e-02
## MSE	8.958750e+03	8.296500e+03	6.365290e+03	8.666687e+03	7.371199e+03
## RMSE	9.465067e+01	9.108513e+01	7.978277e+01	9.309504e+01	8.585568e+01
## RMSSE	1.338563e+02	1.288138e+02	1.128299e+02	1.316563e+02	1.214183e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	6.794532e+01	6.676998e+01	5.672510e+01	151.117097	7.930556e+01
## MAPE	3.938655e-02	3.881648e-02	3.317377e-02	0.088173	4.591242e-02
## MSE	6.100473e+03	5.428590e+03	3.494873e+03	25925.771165	8.650101e+03
## RMSE	7.810553e+01	7.367897e+01	5.911745e+01	161.014817	9.300592e+01
## RMSSE	1.104579e+02	1.041978e+02	8.360470e+01	227.709337	1.315302e+02

According to the results, the most accurate method is ARIMA.

Household\_1 products [Store 2 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	2.427500e+02	2.845000e+02	273.416667	2.668055e+02	2.668064e+02
## MAPE	1.681304e-01	1.974811e-01	0.189407	1.848201e-01	1.848208e-01
## MSE	5.952775e+04	8.194450e+04	75356.861111	7.178535e+04	7.178587e+04
## RMSE	2.439831e+02	2.862595e+02	274.512042	2.679279e+02	2.679288e+02
## RMSSE	3.450442e+02	4.048321e+02	388.218653	3.789072e+02	3.789086e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	2.654275e+02	2.654275e+02	2.607852e+02	2.262535e+02	2.689947e+02
## MAPE	1.838526e-01	1.838526e-01	1.806255e-01	1.565122e-01	1.863432e-01
## MSE	7.110203e+04	7.110203e+04	6.868513e+04	5.274586e+04	7.294132e+04
## RMSE	2.666496e+02	2.666496e+02	2.620785e+02	2.296647e+02	2.700765e+02
## RMSSE	3.770995e+02	3.770995e+02	3.706349e+02	3.247949e+02	3.819458e+02

According to the results, the most accurate method is Naive.

Household\_1 products [Store 3 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	2.160000e+02	1.717500e+02	1.730000e+02	1.959191e+02	1.960520e+02
## MAPE	7.001503e-02	5.551653e-02	5.807837e-02	6.433225e-02	6.437019e-02
## MSE	5.255950e+04	4.485975e+04	4.699425e+04	4.794222e+04	4.796731e+04
## RMSE	2.292586e+02	2.118012e+02	2.167816e+02	2.189571e+02	2.190144e+02
## RMSSE	3.242206e+02	2.995321e+02	3.065754e+02	3.096521e+02	3.097332e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.961046e+02	1.961046e+02	1.842607e+02	1.958574e+02	2.096964e+02
## MAPE	6.438535e-02	6.438535e-02	6.128531e-02	6.433268e-02	6.781331e-02
## MSE	4.797976e+04	4.797976e+04	4.900105e+04	4.810593e+04	4.823925e+04
## RMSE	2.190428e+02	2.190428e+02	2.213618e+02	2.193306e+02	2.196343e+02
## RMSSE	3.097733e+02	3.097733e+02	3.130529e+02	3.101804e+02	3.106099e+02

According to the results, the most accurate method is sNaive.

Household\_2 products [Store 1 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	5.225000e+01	2.725000e+01	22.58333333	25.47057090	25.47154092
## MAPE	5.514986e-02	2.951088e-02	0.02407926	0.02703961	0.02704061
## MSE	3.334750e+03	1.196250e+03	667.36111111	792.13486402	792.18799014



## RMSE	5.774729e+01	3.458685e+01	25.83333333	28.14489055	28.14583433
## RMSSE	8.166701e+01	4.891319e+01	36.53385036	39.80288593	39.80422063
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	23.90222520	23.90222520	17.84522924	6.678635e+01	18.3040827
## MAPE	0.02538718	0.02538718	0.01921111	7.058884e-02	0.0197558
## MSE	739.59410224	739.59410224	544.46666101	5.657522e+03	610.6892915
## RMSE	27.19547944	27.19547944	23.33380940	7.521650e+01	24.7121284
## RMSSE	38.46021587	38.46021587	32.99898971	1.063722e+02	34.9482272

According to the results, the most accurate method is SARIMAX.

Household\_2 products [Store 2 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	8.725000e+01	9.925000e+01	8.991667e+01	8.897973e+01	8.897973e+01
## MAPE	8.426226e-02	9.565861e-02	8.699565e-02	8.603527e-02	8.603527e-02
## MSE	9.388750e+03	1.323875e+04	1.018253e+04	9.897152e+03	9.897149e+03
## RMSE	9.689556e+01	1.150598e+02	1.009085e+02	9.948443e+01	9.948442e+01
## RMSSE	1.370310e+02	1.627191e+02	1.427062e+02	1.406922e+02	1.406922e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	8.899030e+01	8.899030e+01	6.596262e+01	8.908496e+01	8.887715e+01
## MAPE	8.604591e-02	8.604591e-02	6.078762e-02	8.611377e-02	8.593013e-02
## MSE	9.900032e+03	9.900032e+03	6.843569e+03	9.887836e+03	9.866333e+03
## RMSE	9.949890e+01	9.949890e+01	8.272587e+01	9.943760e+01	9.932942e+01
## RMSSE	1.407127e+02	1.407127e+02	1.169920e+02	1.406260e+02	1.404730e+02

According to the results, the most accurate method is SARIMAX.

Household\_2 products [Store 3 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	1.445000e+02	8.375000e+01	3.833333e+01	5.580114e+01	5.580949e+01
## MAPE	1.052483e-01	6.153917e-02	2.797362e-02	4.024952e-02	4.025564e-02
## MSE	2.205300e+04	8.336750e+03	1.620778e+03	4.286517e+03	4.287449e+03
## RMSE	1.485025e+02	9.130580e+01	4.025888e+01	6.547150e+01	6.547861e+01
## RMSSE	2.100143e+02	1.291259e+02	5.693466e+01	9.259068e+01	9.260074e+01
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	5.900285e+01	5.900285e+01	7.226612e+01	2.082318e+02	5.351077e+01
## MAPE	4.266807e-02	4.266807e-02	5.220798e-02	1.509504e-01	3.863192e-02
## MSE	4.406430e+03	4.406430e+03	6.822948e+03	5.142910e+04	3.827219e+03
## RMSE	6.638094e+01	6.638094e+01	8.260114e+01	2.267799e+02	6.186452e+01
## RMSSE	9.387683e+01	9.387683e+01	1.168157e+02	3.207151e+02	8.748965e+01

According to the results, the most accurate method is SARIMAX.

Foods\_1 products [Store 1 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	7.225000e+01	113.500000	6.225000e+01	6.906577e+01	6.906834e+01
## MAPE	6.593694e-02	0.106847	6.032628e-02	6.334377e-02	6.334587e-02
## MSE	6.325250e+03	19226.500000	6.940410e+03	5.993252e+03	5.993488e+03
## RMSE	7.953144e+01	138.659655	8.330912e+01	7.741610e+01	7.741762e+01
## RMSSE	1.124744e+02	196.094365	1.178169e+02	1.094829e+02	1.094850e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.101179e+02	8.058916e+01	6.504126e+01	8.282051e+01	7.798371e+01
## MAPE	9.887969e-02	7.589822e-02	6.334552e-02	7.516503e-02	7.361874e-02
## MSE	1.436957e+04	7.426738e+03	7.638085e+03	7.683378e+03	7.125633e+03
## RMSE	1.198731e+02	8.617852e+01	8.739614e+01	8.765488e+01	8.441347e+01

```
## RMSSE 1.695262e+02 1.218748e+02 1.235968e+02 1.239627e+02 1.193787e+02
```

According to the results, the most accurate method are ES and ESX.

Foods\_1 products [Store 2 - Train Split 2]

```
##           Naive      sNaive      MA      ES      ESX
## MAE      5.300000e+02 4.810000e+02 4.915000e+02 5.121927e+02 5.121915e+02
## MAPE     7.358231e-01 6.692608e-01 6.799396e-01 7.099754e-01 7.099738e-01
## MSE      2.953940e+05 2.428230e+05 2.560662e+05 2.768353e+05 2.768342e+05
## RMSE      5.435016e+02 4.927707e+02 5.060299e+02 5.261514e+02 5.261503e+02
## RMSSE     7.686273e+02 6.968831e+02 7.156343e+02 7.440905e+02 7.440889e+02
##           ARIMA      SARIMA      SARIMAX Holt-Winters State-Space Model
## MAE      4.981932e+02 5.001069e+02 5.008217e+02 5.436148e+02 5.092283e+02
## MAPE     6.916332e-01 6.936565e-01 6.947230e-01 7.538187e-01 7.065283e-01
## MSE      2.611097e+05 2.635477e+05 2.642387e+05 3.115671e+05 2.730942e+05
## RMSE      5.109889e+02 5.133690e+02 5.140415e+02 5.581819e+02 5.225841e+02
## RMSSE     7.226474e+02 7.260134e+02 7.269645e+02 7.893885e+02 7.390456e+02
```

According to the results, the most accurate method is sNaive.

Foods\_1 products [Store 3 - Train Split 2]

```
##           Naive      sNaive      MA      ES      ESX
## MAE      1.117500e+02 2.675000e+02 1.057500e+02 1.184581e+02 1.112340e+02
## MAPE     6.935254e-02 1.759909e-01 7.035103e-02 7.343857e-02 6.903822e-02
## MSE      2.283525e+04 8.444100e+04 1.306075e+04 2.569177e+04 2.263042e+04
## RMSE      1.511134e+02 2.905873e+02 1.142836e+02 1.602865e+02 1.504341e+02
## RMSSE     2.137066e+02 4.109526e+02 1.616215e+02 2.266794e+02 2.127460e+02
##           ARIMA      SARIMA      SARIMAX Holt-Winters State-Space Model
## MAE      5.802416e+01 7.167159e+01 1.669867e+02 1.351023e+02 5.542976e+01
## MAPE     3.977701e-02 4.868689e-02 1.073744e-01 8.452515e-02 3.805368e-02
## MSE      6.268187e+03 7.442008e+03 3.365229e+04 2.967247e+04 4.146253e+03
## RMSE      7.917188e+01 8.626707e+01 1.834456e+02 1.722570e+02 6.439140e+01
## RMSSE     1.119659e+02 1.220001e+02 2.594313e+02 2.436082e+02 9.106319e+01
```

According to the results, the most accurate method is ARIMA.

Foods\_2 products [Store 1 - Train Split 2]

```
##           Naive      sNaive      MA      ES      ESX
## MAE      2.117500e+02 3.187500e+02 9.025000e+01 8.820529e+01 8.821778e+01
## MAPE     1.061426e-01 1.637170e-01 4.503139e-02 4.405112e-02 4.405711e-02
## MSE      5.624225e+04 1.053538e+05 1.378075e+04 1.339876e+04 1.340099e+04
## RMSE      2.371545e+02 3.245824e+02 1.173914e+02 1.157530e+02 1.157626e+02
## RMSSE     3.353871e+02 4.590289e+02 1.660166e+02 1.636995e+02 1.637131e+02
##           ARIMA      SARIMA      SARIMAX Holt-Winters State-Space Model
## MAE      6.345483e+01 1.378983e+02 1.186443e+02 4.182843e+02 4.783821e+01
## MAPE     3.249794e-02 7.117442e-02 6.006210e-02 2.098412e-01 2.407196e-02
## MSE      4.867735e+03 1.927192e+04 1.639120e+04 2.180836e+05 3.369608e+03
## RMSE      6.976915e+01 1.388234e+02 1.280281e+02 4.669943e+02 5.804833e+01
## RMSSE     9.866848e+01 1.963259e+02 1.810591e+02 6.604296e+02 8.209273e+01
```

According to the results, the most accurate method are ES and ESX.

Foods\_2 products [Store 2 - Train Split 2]

```
##           Naive      sNaive      MA      ES      ESX
## MAE      3.832500e+02 134.000000 3.387500e+02 2.871606e+02 2.871638e+02
## MAPE     3.220008e-01 0.107949 2.805572e-01 2.325111e-01 2.325141e-01
```

##	MSE	1.904452e+05	28882.500000	1.583162e+05	1.260259e+05	1.260278e+05
##	RMSE	4.364003e+02	169.948522	3.978897e+02	3.550013e+02	3.550039e+02
##	RMSSE	6.171633e+02	240.343504	5.627011e+02	5.020476e+02	5.020513e+02
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
##	MAE	2.401534e+02	2.552410e+02	3.122998e+02	5.427615e+02	2.763062e+02
##	MAPE	1.921573e-01	2.061757e-01	2.579558e-01	4.585551e-01	2.248353e-01
##	MSE	9.339217e+04	1.012085e+05	1.373061e+05	3.730027e+05	1.141971e+05
##	RMSE	3.056013e+02	3.181329e+02	3.705484e+02	6.107395e+02	3.379307e+02
##	RMSSE	4.321856e+02	4.499078e+02	5.240346e+02	8.637160e+02	4.779061e+02

According to the results, the most accurate method are sNaive.

Foods\_2 products [Store 3 - Train Split 2]

##		Naive	sNaive	MA	ES	ESX
##	MAE	4.757500e+02	4.030000e+02	3.685000e+02	410.11308	4.101364e+02
##	MAPE	1.618913e-01	1.696274e-01	1.300264e-01	0.14239	1.423969e-01
##	MSE	3.298792e+05	2.868835e+05	1.872368e+05	231656.73186	2.316855e+05
##	RMSE	5.743512e+02	5.356151e+02	4.327086e+02	481.30732	4.813372e+02
##	RMSSE	8.122552e+02	7.574741e+02	6.119424e+02	680.67133	6.807135e+02
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
##	MAE	2.037402e+02	2.647001e+02	3.087172e+02	7.905336e+02	2.592633e+02
##	MAPE	7.987317e-02	9.525683e-02	1.042892e-01	2.690436e-01	9.439719e-02
##	MSE	5.451735e+04	9.034511e+04	1.580568e+05	9.015377e+05	8.441217e+04
##	RMSE	2.334895e+02	3.005746e+02	3.975636e+02	9.494934e+02	2.905377e+02
##	RMSSE	3.302040e+02	4.250767e+02	5.622398e+02	1.342786e+03	4.108824e+02

According to the results, the most accurate method is ARIMA.

Foods\_3 products [Store 1 - Train Split 2]

##		Naive	sNaive	MA	ES	ESX
##	MAE	1.355000e+03	7.587500e+02	6.296000e+02	7.286018e+02	7.286146e+02
##	MAPE	1.111682e-01	6.240632e-02	5.162945e-02	5.932074e-02	5.932172e-02
##	MSE	2.142138e+06	7.735628e+05	4.990091e+05	7.121410e+05	7.121734e+05
##	RMSE	1.463604e+03	8.795242e+02	7.064058e+02	8.438845e+02	8.439037e+02
##	RMSSE	2.069849e+03	1.243835e+03	9.990086e+02	1.193433e+03	1.193460e+03
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
##	MAE	8.821377e+02	5.742250e+02	5.679106e+02	2.069211e+03	6.583428e+02
##	MAPE	7.198632e-02	4.688004e-02	4.639378e-02	1.700736e-01	5.413645e-02
##	MSE	1.064883e+06	4.598007e+05	4.478442e+05	4.919622e+06	6.160296e+05
##	RMSE	1.031932e+03	6.780861e+02	6.692116e+02	2.218022e+03	7.848755e+02
##	RMSSE	1.459372e+03	9.589585e+02	9.464081e+02	3.136757e+03	1.109982e+03

According to the results, the most accurate method is State-Space Model.

Foods\_3 products [Store 2 - Train Split 2]

##		Naive	sNaive	MA	ES	ESX
##	MAE	2.451750e+03	2.541000e+03	2.382750e+03	2.448830e+03	2.448832e+03
##	MAPE	3.195973e-01	3.341813e-01	3.100975e-01	3.191952e-01	3.191955e-01
##	MSE	6.859240e+06	7.172024e+06	6.525660e+06	6.844929e+06	6.844941e+06
##	RMSE	2.619015e+03	2.678064e+03	2.554537e+03	2.616281e+03	2.616284e+03
##	RMSSE	3.703847e+03	3.787354e+03	3.612661e+03	3.699981e+03	3.699984e+03
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
##	MAE	2.428894e+03	2.412147e+03	2.363825e+03	2.443818e+03	2.450553e+03
##	MAPE	3.153416e-01	3.136188e-01	3.069491e-01	3.185097e-01	3.194325e-01
##	MSE	6.852601e+06	6.714909e+06	6.485457e+06	6.819989e+06	6.853374e+06

## RMSE	2.617747e+03	2.591314e+03	2.546656e+03	2.611511e+03	2.617895e+03
## RMSSE	3.702054e+03	3.664672e+03	3.601515e+03	3.693234e+03	3.702263e+03

According to the results, the most accurate method is SARIMAX.

Foods\_3 products [Store 3 - Train Split 2]

##	Naive	sNaive	MA	ES	ESX
## MAE	3.036500e+03	2.324250e+03	2.290200e+03	2.435899e+03	2.435907e+03
## MAPE	1.708047e-01	1.386909e-01	1.343674e-01	1.414809e-01	1.414814e-01
## MSE	1.324117e+07	7.290379e+06	6.444766e+06	7.421587e+06	7.421650e+06
## RMSE	3.638842e+03	2.700070e+03	2.538654e+03	2.724259e+03	2.724271e+03
## RMSSE	5.146100e+03	3.818476e+03	3.590199e+03	3.852684e+03	3.852700e+03
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	2.568326e+03	2.326620e+03	2.153745e+03	4.265257e+03	2.489357e+03
## MAPE	1.470870e-01	1.377414e-01	1.294883e-01	2.438975e-01	1.465792e-01
## MSE	8.537364e+06	6.207423e+06	5.260909e+06	2.367403e+07	7.199245e+06
## RMSE	2.921877e+03	2.491470e+03	2.293667e+03	4.865597e+03	2.683141e+03
## RMSSE	4.132158e+03	3.523471e+03	3.243735e+03	6.880993e+03	3.794534e+03

According to the results, the most accurate method is SARIMAX.

###SPLIT 3

Let's analyze the forecast for the Hobbies products [Store 1 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	3.617500e+02	1.895000e+02	1.377500e+02	1.349964e+02	1.349929e+02
## MAPE	1.322972e-01	6.991991e-02	5.052552e-02	4.965330e-02	4.965221e-02
## MSE	1.606098e+05	5.462900e+04	2.982325e+04	2.994996e+04	2.995015e+04
## RMSE	4.007615e+02	2.337285e+02	1.726941e+02	1.730606e+02	1.730611e+02
## RMSSE	5.667623e+02	3.305420e+02	2.442263e+02	2.447446e+02	2.447454e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.357748e+02	1.324515e+02	1.260691e+02	3.678905e+02	1.364309e+02
## MAPE	4.987404e-02	4.879155e-02	4.684135e-02	1.352595e-01	5.010768e-02
## MSE	2.728918e+04	2.981787e+04	3.197236e+04	1.880610e+05	2.987638e+04
## RMSE	1.651944e+02	1.726785e+02	1.788082e+02	4.336600e+02	1.728479e+02
## RMSSE	2.336201e+02	2.442043e+02	2.528730e+02	6.132879e+02	2.444438e+02

According to the results, the most accurate method is ARIMA.

[Store 2 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	2.002500e+02	9.550000e+01	75.3125000	7.593242e+01	7.484922e+01
## MAPE	9.553647e-02	4.514984e-02	0.0356763	3.594774e-02	3.547345e-02
## MSE	4.707575e+04	1.126150e+04	7168.2031250	7.204146e+03	7.143349e+03
## RMSE	2.169695e+02	1.061202e+02	84.6652415	8.487724e+01	8.451834e+01
## RMSSE	3.068412e+02	1.500766e+02	119.7347328	1.200345e+02	1.195270e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	9.663432e+01	9.285832e+01	5.687711e+01	2.069421e+02	7.689962e+01
## MAPE	4.494329e-02	4.265678e-02	2.717068e-02	9.862323e-02	3.637124e-02
## MSE	1.115068e+04	1.163404e+04	4.898587e+03	5.304239e+04	7.266364e+03
## RMSE	1.055968e+02	1.078612e+02	6.998991e+01	2.303093e+02	8.524297e+01
## RMSSE	1.493364e+02	1.525388e+02	9.898067e+01	3.257066e+02	1.205518e+02

According to the results, the most accurate methods are MA and ESX.

[Store 3 - Train Split 3]

##		Naive	sNaive	MA	ES	ESX
## MAE	3.807500e+02	2.230000e+02	1.699500e+02	1.896747e+02	1.896752e+02	
## MAPE	1.264129e-01	7.360630e-02	5.626115e-02	6.315446e-02	6.315462e-02	
## MSE	1.669212e+05	5.514250e+04	3.386441e+04	4.403248e+04	4.403275e+04	
## RMSE	4.085600e+02	2.348244e+02	1.840229e+02	2.098392e+02	2.098398e+02	
## RMSSE	5.777911e+02	3.320919e+02	2.602476e+02	2.967574e+02	2.967583e+02	
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.789345e+02	1.789345e+02	1.823711e+02	2.443971e+02		1.896915e+02
## MAPE	5.952624e-02	5.952624e-02	6.067006e-02	8.200204e-02		6.316053e-02
## MSE	3.926015e+04	3.926015e+04	4.063189e+04	8.403203e+04		4.404421e+04
## RMSE	1.981418e+02	1.981418e+02	2.015735e+02	2.898828e+02		2.098671e+02
## RMSSE	2.802148e+02	2.802148e+02	2.850680e+02	4.099562e+02		2.967969e+02

According to the results, the most accurate method is MA.

Household\_1 products [Store 1 - Train Split 3]

##		Naive	sNaive	MA	ES	ESX
## MAE	4.297500e+02	2.357500e+02	1.924500e+02	214.097005	2.168726e+02	
## MAPE	2.792509e-01	1.572398e-01	1.304579e-01	0.144838	1.465396e-01	
## MSE	2.126442e+05	8.067675e+04	6.077451e+04	73912.872720	7.499291e+04	
## RMSE	4.611337e+02	2.840365e+02	2.465249e+02	271.869220	2.738483e+02	
## RMSSE	6.521415e+02	4.016883e+02	3.486388e+02	384.481138	3.872800e+02	
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	2.180099e+02	2.180099e+02	2.264975e+02	3.650286e+02		1.979582e+02
## MAPE	1.475152e-01	1.475152e-01	1.526326e-01	2.387387e-01		1.344228e-01
## MSE	7.710826e+04	7.710826e+04	7.993062e+04	1.628305e+05		6.543812e+04
## RMSE	2.776837e+02	2.776837e+02	2.827200e+02	4.035227e+02		2.558088e+02
## RMSSE	3.927041e+02	3.927041e+02	3.998265e+02	5.706672e+02		3.617682e+02

According to the results, the most accurate method is MA.

Household\_1 products [Store 2 - Train Split 3]

##		Naive	sNaive	MA	ES	ESX
## MAE	3.095000e+02	1.497500e+02	1.605000e+02	183.050297	1.843851e+02	
## MAPE	1.932652e-01	9.433660e-02	1.007172e-01	0.115879	1.167756e-01	
## MSE	1.123635e+05	2.922125e+04	3.232350e+04	45681.753196	4.659581e+04	
## RMSE	3.352067e+02	1.709422e+02	1.797874e+02	213.732902	2.158606e+02	
## RMSSE	4.740538e+02	2.417488e+02	2.542577e+02	302.263968	3.052730e+02	
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.796816e+02	1.796816e+02	1.791388e+02	2.994868e+02		1.809607e+02
## MAPE	1.140229e-01	1.140229e-01	1.138102e-01	1.864956e-01		1.145787e-01
## MSE	4.552206e+04	4.552206e+04	4.585597e+04	1.038894e+05		4.476490e+04
## RMSE	2.133590e+02	2.133590e+02	2.141401e+02	3.223188e+02		2.115772e+02
## RMSSE	3.017352e+02	3.017352e+02	3.028398e+02	4.558277e+02		2.992153e+02

According to the results, the most accurate method is sNaive.

Household\_1 products [Store 3 - Train Split 3]

##		Naive	sNaive	MA	ES	ESX
## MAE	6.655000e+02	4.445000e+02	3.415000e+02	3.935453e+02	3.935524e+02	
## MAPE	2.668831e-01	1.846556e-01	1.423095e-01	1.623202e-01	1.623230e-01	
## MSE	5.129305e+05	3.159930e+05	1.866625e+05	2.249182e+05	2.249238e+05	
## RMSE	7.161917e+02	5.621325e+02	4.320446e+02	4.742554e+02	4.742613e+02	
## RMSSE	1.012848e+03	7.949755e+02	6.110033e+02	6.706984e+02	6.707067e+02	
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model

## MAE	4.016583e+02	4.016583e+02	4.120807e+02	6.195173e+02	3.646608e+02
## MAPE	1.652415e-01	1.652415e-01	1.691855e-01	2.505134e-01	1.511051e-01
## MSE	2.286942e+05	2.286942e+05	2.363884e+05	4.786972e+05	2.015569e+05
## RMSE	4.782198e+02	4.782198e+02	4.861979e+02	6.918795e+02	4.489509e+02
## RMSSE	6.763050e+02	6.763050e+02	6.875876e+02	9.784653e+02	6.349124e+02

According to the results, the most accurate method is MA.

Household\_2 products [Store 1 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	5.225000e+01	6.525000e+01	5.558333e+01	4.524850e+01	4.524859e+01
## MAPE	6.699817e-02	8.312825e-02	6.735968e-02	5.605909e-02	5.605919e-02
## MSE	4.221750e+03	6.761750e+03	3.730861e+03	3.024709e+03	3.024712e+03
## RMSE	6.497500e+01	8.222986e+01	6.108078e+01	5.499736e+01	5.499738e+01
## RMSSE	9.188852e+01	1.162906e+02	8.638126e+01	7.777801e+01	7.777804e+01
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	4.868412e+01	4.868412e+01	4.600643e+01	4.526814e+01	5.251621e+01
## MAPE	5.998731e-02	5.998731e-02	5.689418e-02	5.684163e-02	6.386012e-02
## MSE	3.124903e+03	3.124903e+03	3.150213e+03	3.352274e+03	3.407308e+03
## RMSE	5.590083e+01	5.590083e+01	5.612676e+01	5.789882e+01	5.837215e+01
## RMSSE	7.905571e+01	7.905571e+01	7.937522e+01	8.188130e+01	8.255069e+01

According to the results, the most accurate methods are ES and ESX.

Household\_2 products [Store 2 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	1.050000e+02	135.500000	7.500000e+01	7.500000e+01	7.500000e+01
## MAPE	8.979353e-02	0.114048	5.891762e-02	6.102018e-02	6.102009e-02
## MSE	1.277450e+04	24765.500000	1.020028e+04	7.805892e+03	7.805922e+03
## RMSE	1.130243e+02	157.370582	1.009964e+02	8.835096e+01	8.835113e+01
## RMSSE	1.598405e+02	222.555611	1.428305e+02	1.249471e+02	1.249474e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	7.530484e+01	7.530484e+01	7.514369e+01	1.148063e+02	7.500000e+01
## MAPE	6.132947e-02	6.132947e-02	6.079805e-02	9.931688e-02	6.093729e-02
## MSE	7.827841e+03	7.827841e+03	8.306621e+03	1.772865e+04	7.836133e+03
## RMSE	8.847508e+01	8.847508e+01	9.114066e+01	1.331490e+02	8.852193e+01
## RMSSE	1.251227e+02	1.251227e+02	1.288924e+02	1.883011e+02	1.251889e+02

According to the results, the most accurate methods are ES and ESX.

Household\_2 products [Store 3 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	1.095000e+02	2.225000e+02	8.700000e+01	8.650000e+01	8.650000e+01
## MAPE	1.119029e-01	2.204363e-01	8.365280e-02	8.784983e-02	8.784935e-02
## MSE	2.207500e+04	7.034550e+04	1.119700e+04	1.405365e+04	1.405298e+04
## RMSE	1.485766e+02	2.652273e+02	1.058159e+02	1.185481e+02	1.185453e+02
## RMSSE	2.101190e+02	3.750880e+02	1.496462e+02	1.676523e+02	1.676483e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	8.512151e+01	8.512151e+01	8.521654e+01	8.108240e+01	8.650000e+01
## MAPE	8.599988e-02	8.599988e-02	8.557886e-02	8.301106e-02	8.817422e-02
## MSE	1.317588e+04	1.317588e+04	1.293274e+04	1.337959e+04	1.452352e+04
## RMSE	1.147862e+02	1.147862e+02	1.137222e+02	1.156702e+02	1.205136e+02
## RMSSE	1.623323e+02	1.623323e+02	1.608275e+02	1.635823e+02	1.704319e+02

According to the results, the most accurate method is MA.

Foods\_1 products [Store 1 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	1.767500e+02	1.860000e+02	1.357500e+02	1.357500e+02	1.357500e+02
## MAPE	1.938094e-01	2.055953e-01	1.456433e-01	1.468694e-01	1.468694e-01
## MSE	5.549975e+04	7.230950e+04	2.966879e+04	3.117095e+04	3.117096e+04
## RMSE	2.355838e+02	2.689043e+02	1.722463e+02	1.765530e+02	1.765530e+02
## RMSSE	3.331659e+02	3.802880e+02	2.435931e+02	2.496836e+02	2.496836e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	72.4116099	72.4116099	7.453392e+01	1.842136e+02	8.168511e+01
## MAPE	0.0740921	0.0740921	7.678396e-02	2.006899e-01	8.410504e-02
## MSE	6533.5927447	6533.5927447	6.901527e+03	5.756818e+04	8.077730e+03
## RMSE	80.8306424	80.8306424	8.307543e+01	2.399337e+02	8.987619e+01
## RMSSE	114.3117907	114.3117907	1.174864e+02	3.393175e+02	1.271041e+02

According to the results, the most accurate methods are ARIMA and SARIMA.

Foods\_1 products [Store 2 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	2.057500e+02	1.207500e+02	1.022500e+02	1.150753e+02	1.422974e+02
## MAPE	2.162668e-01	1.297597e-01	1.081595e-01	1.279861e-01	1.544276e-01
## MSE	5.758375e+04	2.486225e+04	1.625875e+04	2.864216e+04	3.549925e+04
## RMSE	2.399661e+02	1.576777e+02	1.275098e+02	1.692399e+02	1.884124e+02
## RMSSE	3.393634e+02	2.229899e+02	1.803261e+02	2.393414e+02	2.664554e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.641347e+02	1.641347e+02	1.643390e+02	2.015610e+02	1.226563e+02
## MAPE	1.718273e-01	1.718273e-01	1.720023e-01	2.125404e-01	1.352859e-01
## MSE	3.618691e+04	3.618691e+04	3.622514e+04	5.677593e+04	3.029526e+04
## RMSE	1.902286e+02	1.902286e+02	1.903290e+02	2.382770e+02	1.740553e+02
## RMSSE	2.690238e+02	2.690238e+02	2.691659e+02	3.369746e+02	2.461514e+02

According to the results, the most accurate method is MA.

Foods\_1 products [Store 3 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	3.297500e+02	2.647500e+02	2.238500e+02	2.248942e+02	2.287624e+02
## MAPE	2.793173e-01	2.267528e-01	1.879222e-01	1.888704e-01	1.923828e-01
## MSE	1.607438e+05	1.192388e+05	7.419479e+04	7.482129e+04	7.721810e+04
## RMSE	4.009286e+02	3.453096e+02	2.723872e+02	2.735348e+02	2.778814e+02
## RMSSE	5.669987e+02	4.883416e+02	3.852137e+02	3.868366e+02	3.929837e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	1.278827e+02	1.297700e+02	1.351426e+02	4.147577e+02	1.255631e+02
## MAPE	1.091956e-01	1.104462e-01	1.152143e-01	3.455780e-01	1.057387e-01
## MSE	2.614427e+04	2.674125e+04	2.899205e+04	2.338171e+05	2.336181e+04
## RMSE	1.616919e+02	1.635275e+02	1.702705e+02	4.835464e+02	1.528457e+02
## RMSSE	2.286669e+02	2.312628e+02	2.407989e+02	6.838379e+02	2.161565e+02

According to the results, the most accurate method is State-Space Model.

Foods\_2 products [Store 1 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	177.250000	2.887500e+02	3.562500e+02	2.600007e+02	2.599936e+02
## MAPE	0.117157	1.910346e-01	2.333517e-01	1.708732e-01	1.708685e-01
## MSE	36557.750000	1.031958e+05	1.320542e+05	7.274056e+04	7.273683e+04
## RMSE	191.200811	3.212410e+02	3.633927e+02	2.697046e+02	2.696977e+02
## RMSSE	270.398780	4.543033e+02	5.139149e+02	3.814199e+02	3.814101e+02

##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	2.221096e+02	2.221096e+02	2.962507e+02	1.381133e+02	3.074019e+02
## MAPE	1.462791e-01	1.462791e-01	1.945423e-01	9.055121e-02	2.012944e-01
## MSE	5.558515e+04	5.558515e+04	9.437038e+04	2.059693e+04	9.885634e+04
## RMSE	2.357650e+02	2.357650e+02	3.071976e+02	1.435163e+02	3.144143e+02
## RMSSE	3.334221e+02	3.334221e+02	4.344431e+02	2.029627e+02	4.446489e+02

According to the results, the most accurate method is Holt-Winters.

Foods\_2 products [Store 2 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	2.035000e+02	2.577500e+02	2.310000e+02	2.140424e+02	214.042170
## MAPE	1.519228e-01	1.915475e-01	1.720613e-01	1.596431e-01	0.159643
## MSE	4.670350e+04	7.774725e+04	5.865225e+04	5.110539e+04	51105.300661
## RMSE	2.161099e+02	2.788319e+02	2.421823e+02	2.260650e+02	226.064815
## RMSSE	3.056256e+02	3.943279e+02	3.424974e+02	3.197042e+02	319.703928
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	2.245127e+02	2.245127e+02	2.117646e+02	1.872156e+02	1.245983e+02
## MAPE	1.672974e-01	1.672974e-01	1.580446e-01	1.400683e-01	9.434483e-02
## MSE	5.564208e+04	5.564208e+04	5.046492e+04	4.073329e+04	2.254768e+04
## RMSE	2.358857e+02	2.358857e+02	2.246440e+02	2.018249e+02	1.501589e+02
## RMSSE	3.335928e+02	3.335928e+02	3.176946e+02	2.854235e+02	2.123567e+02

According to the results, the most accurate method are State-Space Model.

Foods\_2 products [Store 3 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	3.457500e+02	1.016500e+03	5.717500e+02	4.379990e+02	4.379734e+02
## MAPE	1.761293e-01	4.940617e-01	2.829213e-01	2.197198e-01	2.197077e-01
## MSE	1.754742e+05	1.146714e+06	3.828292e+05	2.477743e+05	2.477519e+05
## RMSE	4.188965e+02	1.070848e+03	6.187320e+02	4.977693e+02	4.977468e+02
## RMSSE	5.924091e+02	1.514407e+03	8.750191e+02	7.039521e+02	7.039203e+02
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	4.455586e+02	5.590791e+02	5.208391e+02	265.702432	4.633960e+02
## MAPE	2.248814e-01	2.776375e-01	2.605625e-01	0.125413	2.317068e-01
## MSE	2.703218e+05	3.769821e+05	3.449196e+05	84952.445764	2.703759e+05
## RMSE	5.199249e+02	6.139886e+02	5.872986e+02	291.466028	5.199768e+02
## RMSSE	7.352848e+02	8.683111e+02	8.305656e+02	412.195210	7.353583e+02

According to the results, the most accurate method is Holt-Winters.

Foods\_3 products [Store 1 - Train Split 3]

##	Naive	sNaive	MA	ES	ESX
## MAE	4.917500e+02	1.324250e+03	7.796500e+02	8.190628e+02	8.191472e+02
## MAPE	5.541302e-02	1.464020e-01	8.664945e-02	9.090145e-02	9.091055e-02
## MSE	4.248758e+05	2.236461e+06	8.190548e+05	8.820645e+05	8.822028e+05
## RMSE	6.518249e+02	1.495480e+03	9.050165e+02	9.391829e+02	9.392565e+02
## RMSSE	9.218197e+02	2.114928e+03	1.279887e+03	1.328205e+03	1.328309e+03
##	ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE	9.306082e+02	5.527747e+02	5.515585e+02	4.012707e+02	5.931371e+02
## MAPE	1.023567e-01	6.154638e-02	6.142294e-02	4.352094e-02	6.642044e-02
## MSE	1.019585e+06	4.275309e+05	4.269628e+05	2.647617e+05	5.514028e+05
## RMSE	1.009745e+03	6.538585e+02	6.534239e+02	5.145500e+02	7.425650e+02
## RMSSE	1.427995e+03	9.246956e+02	9.240810e+02	7.276836e+02	1.050145e+03

According to the results, the most accurate method is Holt-Winters.



Foods\_3 products [Store 2 - Train Split 3]

```
## Warning in HoltWinters(train3$Foods_3_CA_2, gamma = FALSE): optimization
## difficulties: ERROR: ABNORMAL_TERMINATION_IN_LNSRCH
```

##		Naive	sNaive	MA	ES	ESX
## MAE		7.027500e+02	1.061750e+03	6.345000e+02	6.599248e+02	6.599249e+02
## MAPE		8.435993e-02	1.269964e-01	7.534896e-02	7.870577e-02	7.870579e-02
## MSE		5.825658e+05	1.164778e+06	5.074908e+05	5.311028e+05	5.311029e+05
## RMSE		7.632599e+02	1.079249e+03	7.123839e+02	7.287680e+02	7.287681e+02
## RMSSE		1.079413e+03	1.526288e+03	1.007463e+03	1.030634e+03	1.030634e+03
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE		6.958665e+02	6.070624e+02	5.756588e+02	7.033945e+02	6.610583e+02
## MAPE		8.225377e-02	7.219454e-02	6.810109e-02	8.482393e-02	7.885542e-02
## MSE		6.106308e+05	4.724789e+05	4.429657e+05	5.896563e+05	5.322759e+05
## RMSE		7.814287e+02	6.873710e+02	6.655567e+02	7.678908e+02	7.295724e+02
## RMSSE		1.105107e+03	9.720894e+02	9.412393e+02	1.085962e+03	1.031771e+03

According to the results, the most accurate method is SARIMAX.

Foods\_3 products [Store 3 - Train Split 3]

##		Naive	sNaive	MA	ES	ESX
## MAE		9.342500e+02	2.512500e+03	1.307450e+03	1.194084e+03	1.194041e+03
## MAPE		8.794805e-02	2.223521e-01	1.207147e-01	1.112673e-01	1.112636e-01
## MSE		2.015955e+06	8.284870e+06	3.247554e+06	2.963966e+06	2.963862e+06
## RMSE		1.419843e+03	2.878345e+03	1.802097e+03	1.721617e+03	1.721587e+03
## RMSSE		2.007962e+03	4.070594e+03	2.548550e+03	2.434735e+03	2.434692e+03
##		ARIMA	SARIMA	SARIMAX	Holt-Winters	State-Space Model
## MAE		9.217904e+02	1.088953e+03	1.111362e+03	1.003031e+03	1.049643e+03
## MAPE		8.338922e-02	1.000360e-01	1.021665e-01	8.759257e-02	9.680927e-02
## MSE		1.332411e+06	2.155678e+06	2.276884e+06	1.480259e+06	2.075180e+06
## RMSE		1.154301e+03	1.468223e+03	1.508935e+03	1.216659e+03	1.440548e+03
## RMSSE		1.632428e+03	2.076380e+03	2.133956e+03	1.720616e+03	2.037243e+03

According to the results, the most accurate method is ARIMA.