Assignment 2 : MTech EBAC Unit 3B – Group Exercise – Time Series Forecasting – 10%

Due Date : 8th September, 2017 : **Please mention the name of the group members and the name of the group in your submission cover page.** Output should be in Word or PDF. The name of the word file should be your group name and in the format XXUnit3B_Asn2 where XX is your group name. Please do not put the word "Team" before the group name as I know you are a team.

Use the data in the file ActualRatings_weeklyGRP.xls. This is a TV channel rating data (actual) of an **Indian** network. Please use the data up to 28th Dec 2008 and fit a time series model and perform weekly forecast from Jan – 15Mar 2009.

Try the following methods :

1) Exponential Smoothing 2) ARIMA 3)Decomposition Methods 4) Time series Regression

A) While choosing the method, if you find any of the above technique is inappropriate for the given series please articulate why it is so.

B) If you are doing forecasting using multiple methods, please recommend one solution which you think is best and provide the reason for it.

C) In case there are points in the **entire** series where the model is over/under predicting significantly (>10% error) find a possible reason as the ratings are greatly affected by special events like festival/ sports match etc.

Please keep the report limited to 10 pages. Shorter is the report (≤10) (with all points covered) higher is the final CA score.

Plot

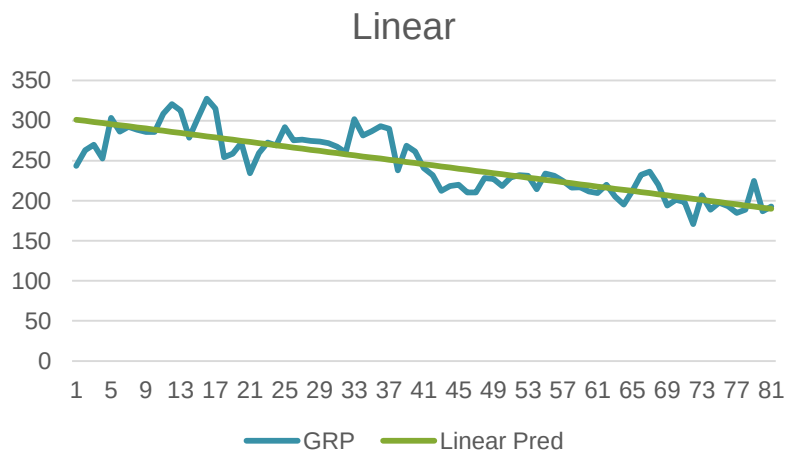
Linear

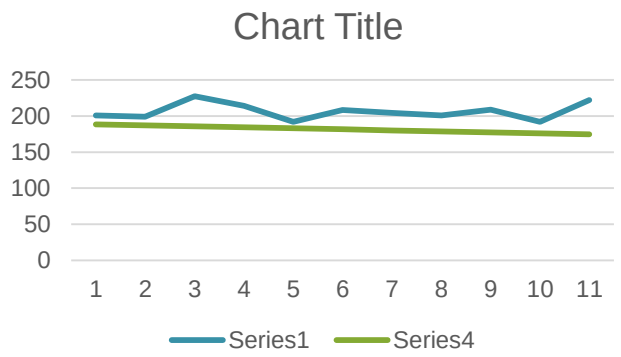
Model Summary and Parameter Estimates

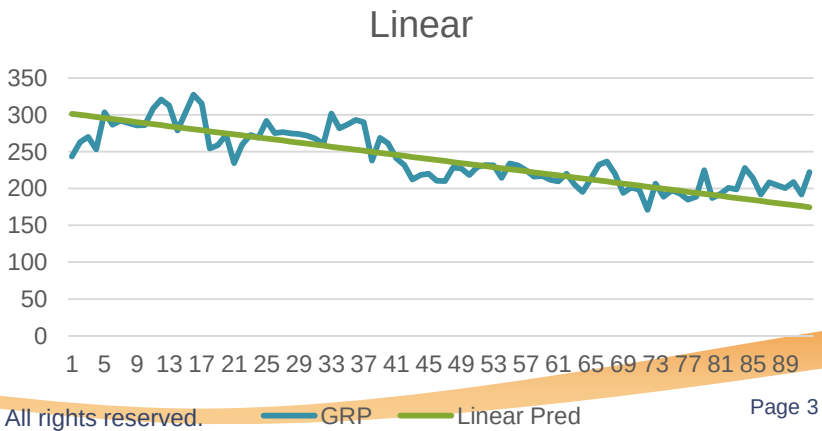
Dependent Variable: GRP

Equation	Model Summary					Parameter Estimates		
	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.715	197.948	1	79	.000	302.565	-1.391	
Quadratic	.727	103.679	2	78	.000	292.821	-.687	-.009

The independent variable is Time.







Quadratic

Model Summary and Parameter Estimates

Dependent Variable: GRP

Equation	Model Summary					Parameter Estimates		
	R Square	F	df1	df2	Sig.	Constant	b1	b2
Linear	.715	197.948	1	79	.000	302.565	-1.391	
Quadratic	.727	103.679	2	78	.000	292.821	-.687	-.009

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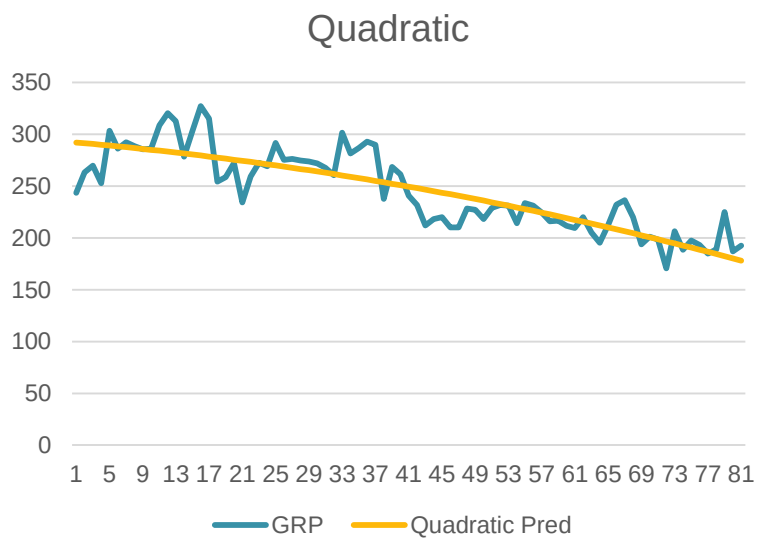
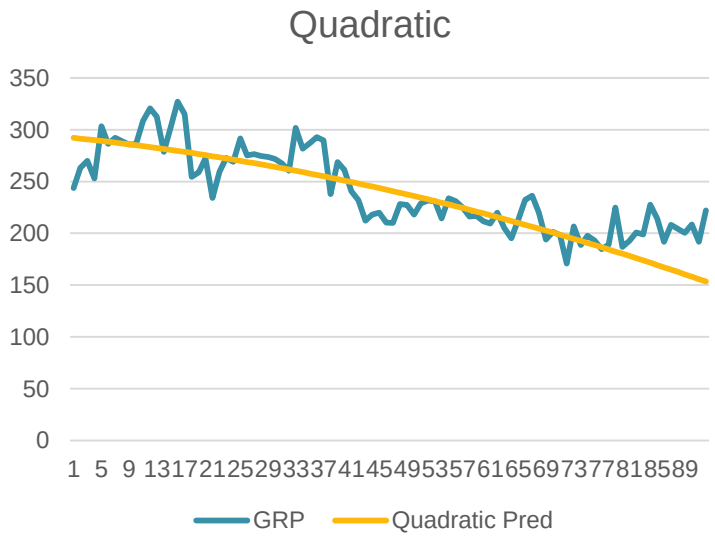
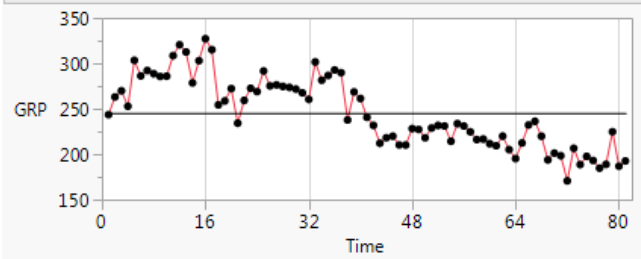




Time Series Basic Diagonostics

Time Series GRP



Mean	245.52543
Std	38.474749
N	81
Zero Mean ADF	-0.602168
Single Mean ADF	-2.061766
Trend ADF	-5.326826

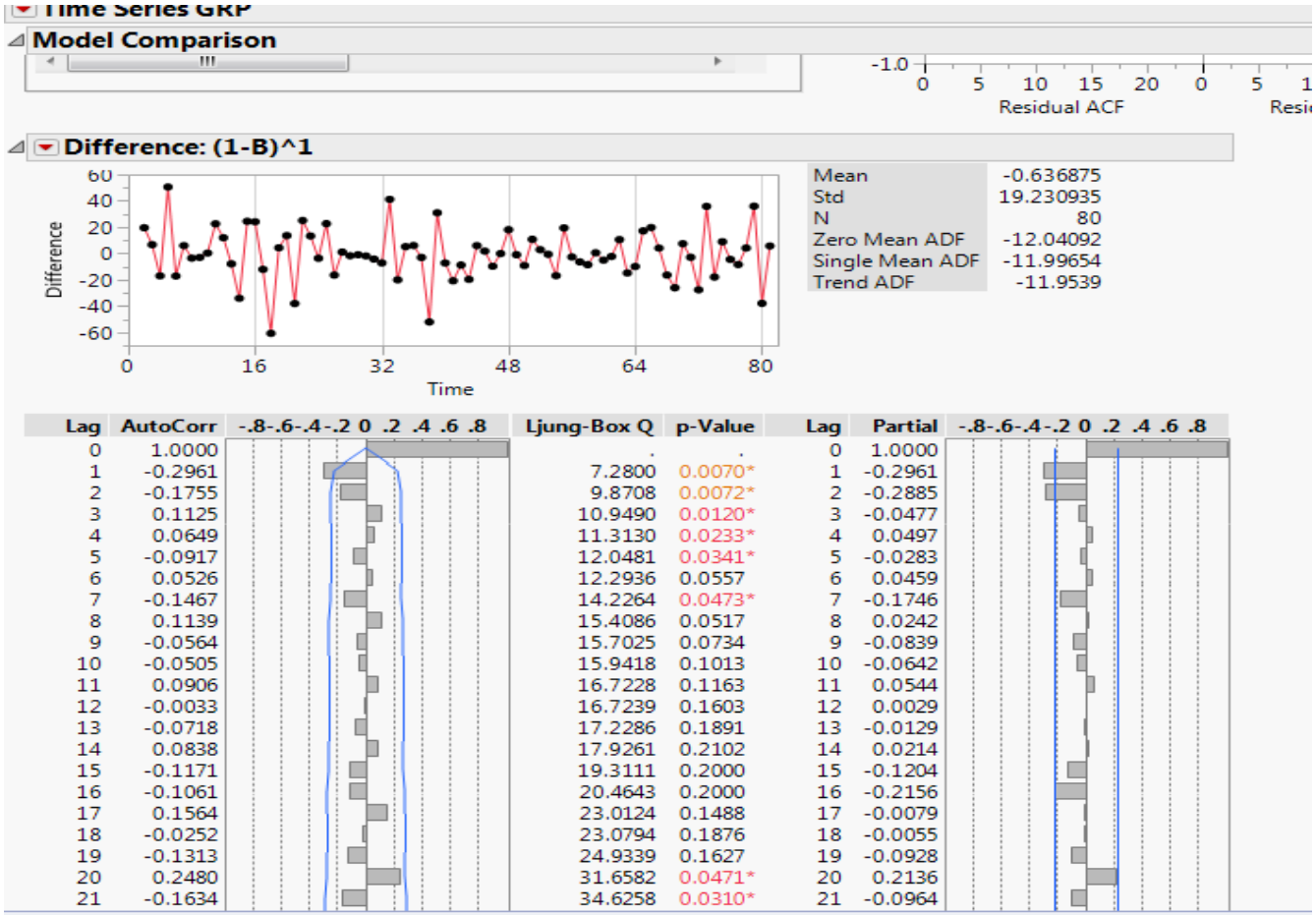
Time Series Basic Diagnostics

Lag	AutoCorr	Ljung-Box Q	p-Value	Lag	Partial
0	1.0000	.	.	0	1.0000
1	0.8648	62.8523	<.0001*	1	0.8648
2	0.8001	117.326	<.0001*	2	0.2069
3	0.7952	171.832	<.0001*	3	0.2799
4	0.7461	220.439	<.0001*	4	-0.0326
5	0.6794	261.266	<.0001*	5	-0.0917
6	0.6381	297.768	<.0001*	6	-0.0274
7	0.5855	328.910	<.0001*	7	-0.0767
8	0.5644	358.250	<.0001*	8	0.1264
9	0.5227	383.761	<.0001*	9	-0.0399
10	0.4784	405.434	<.0001*	10	-0.0015
11	0.4586	425.630	<.0001*	11	0.0309
12	0.4171	442.584	<.0001*	12	-0.0856
13	0.3724	456.299	<.0001*	13	-0.0262
14	0.3561	469.020	<.0001*	14	0.0306
15	0.3262	479.861	<.0001*	15	-0.0017
16	0.3233	490.675	<.0001*	16	0.1444
17	0.3371	502.612	<.0001*	17	0.1207
18	0.3033	512.432	<.0001*	18	-0.0917
19	0.2799	520.926	<.0001*	19	-0.0705
20	0.2952	530.533	<.0001*	20	0.0378
21	0.2439	537.200	<.0001*	21	-0.1918
22	0.2340	543.439	<.0001*	22	0.1155
23	0.2086	548.483	<.0001*	23	-0.1027
24	0.1767	552.165	<.0001*	24	0.0216
25	0.1391	554.488	<.0001*	25	-0.1207

Summary of the Behaviors of ACF and PACF

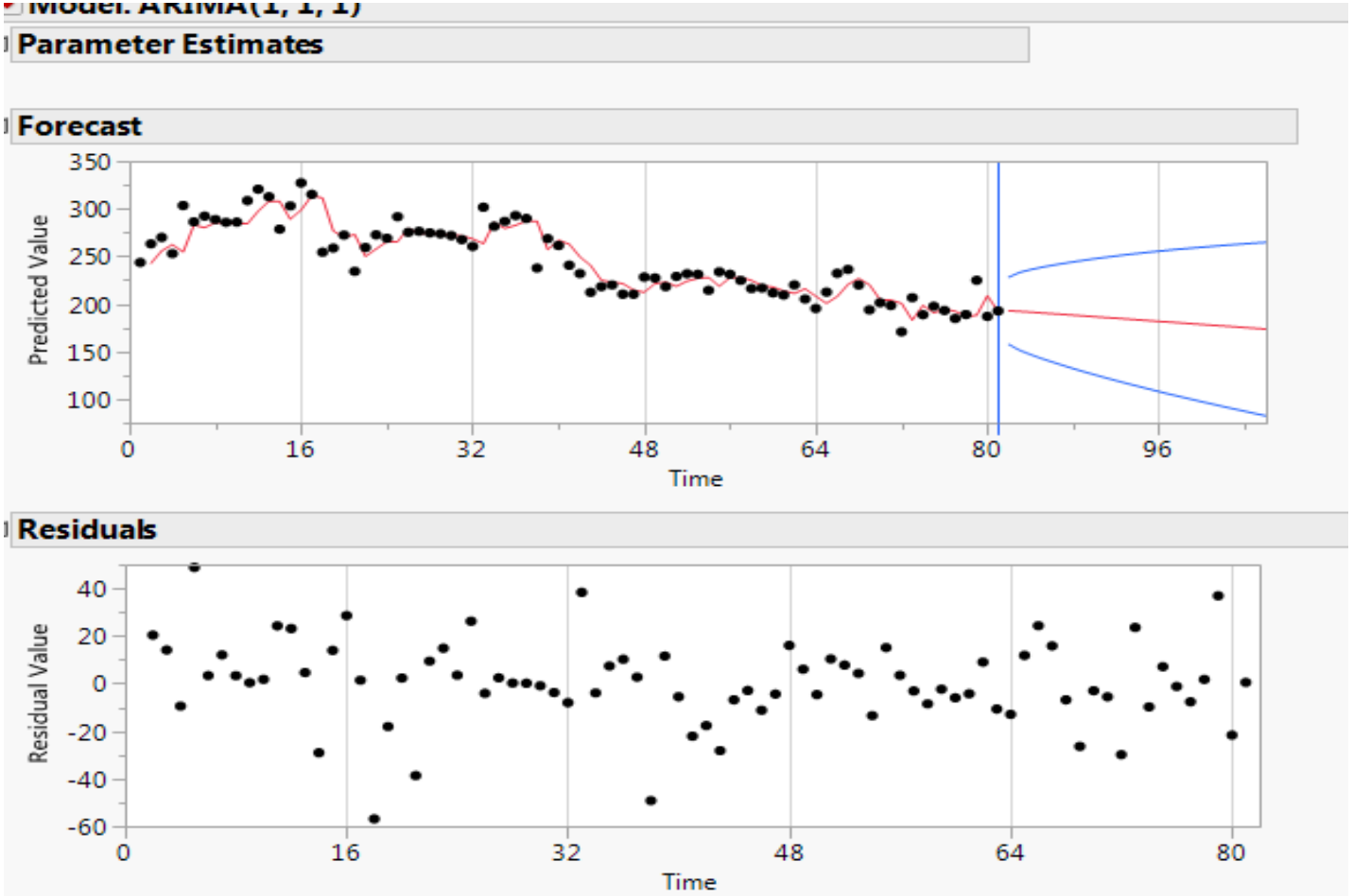
Behaviors of ACF and PACF for general non-seasonal models

Process	ACF	PACF
AR(p)	Dies down.	Cuts off after lag p.
MA(q)	Cuts off after lag q.	Dies down.
ARMA(p,q)	Dies down.	Dies down.

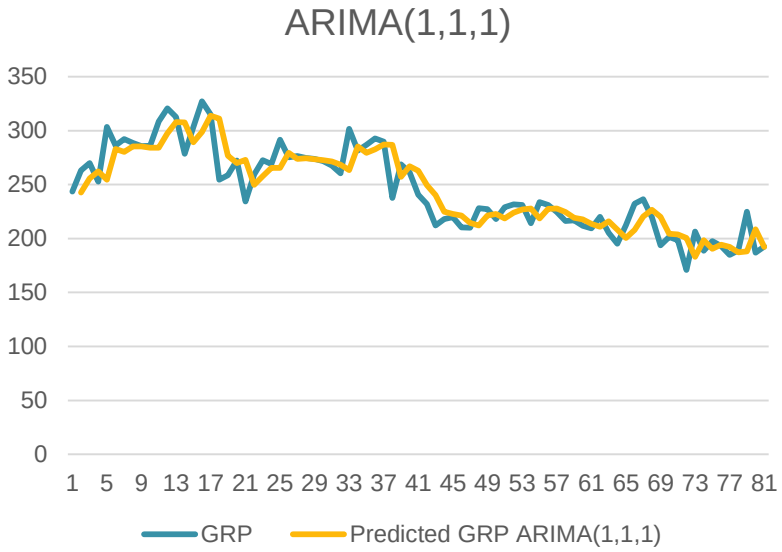


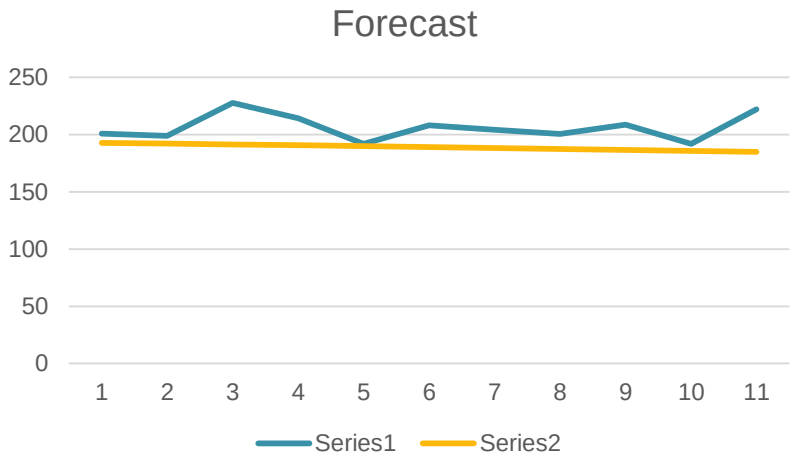
Lag	AutoCorr	-.8 -.6 -.4 -.2 0 .2 .4 .6 .8	Ljung-Box Q	p-Value	Lag	Partial	-.8 -.6 -.4 -.2 0 .2 .4 .6 .8
0	1.0000		.	.	0	1.0000	
1	-0.2961		7.2800	0.0070*	1	-0.2961	
2	-0.1755		9.8708	0.0072*	2	-0.2885	
3	0.1125		10.9490	0.0120*	3	-0.0477	
4	0.0649		11.3130	0.0233*	4	0.0497	
5	-0.0917		12.0481	0.0341*	5	-0.0283	
6	0.0526		12.2936	0.0557	6	0.0459	
7	-0.1467		14.2264	0.0473*	7	-0.1746	
8	0.1139		15.4086	0.0517	8	0.0242	
9	-0.0564		15.7025	0.0734	9	-0.0839	
10	-0.0505		15.9418	0.1013	10	-0.0642	
11	0.0906		16.7228	0.1163	11	0.0544	
12	-0.0033		16.7239	0.1603	12	0.0029	
13	-0.0718		17.2286	0.1891	13	-0.0129	
14	0.0838		17.9261	0.2102	14	0.0214	
15	-0.1171		19.3111	0.2000	15	-0.1204	
16	-0.1061		20.4643	0.2000	16	-0.2156	
17	0.1564		23.0124	0.1488	17	-0.0079	
18	-0.0252		23.0794	0.1876	18	-0.0055	
19	-0.1313		24.9339	0.1627	19	-0.0928	
20	0.2480		31.6582	0.0471*	20	0.2136	
21	-0.1634		34.6258	0.0310*	21	-0.0964	

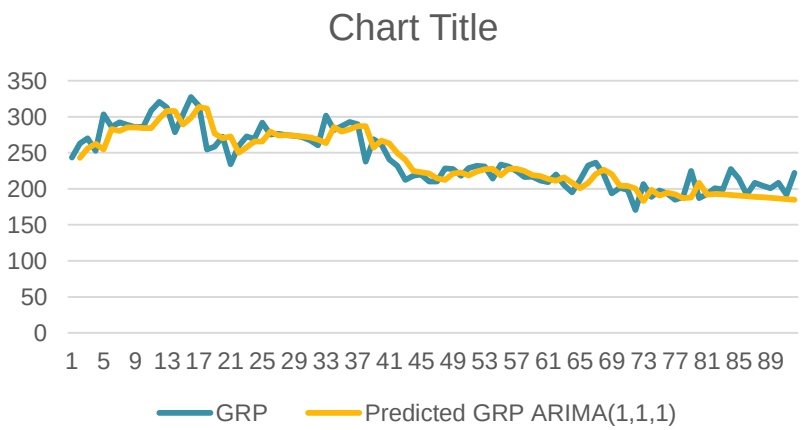
Time Series Basic Diagnostics



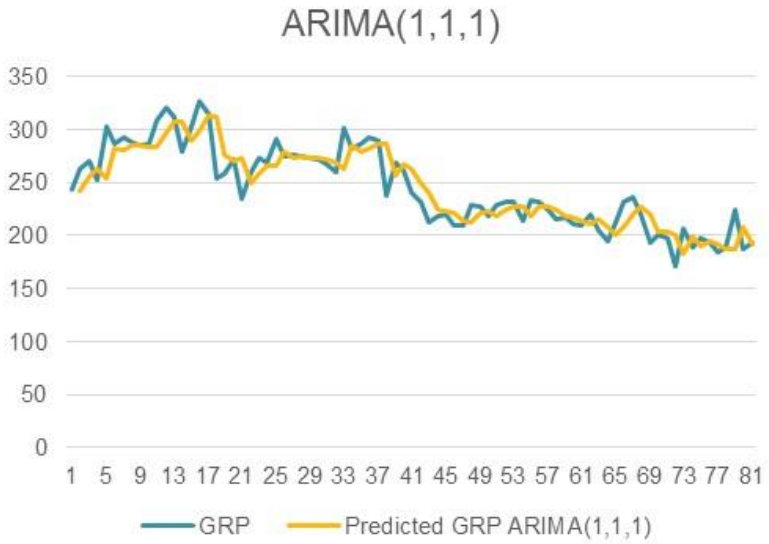
ARIMA

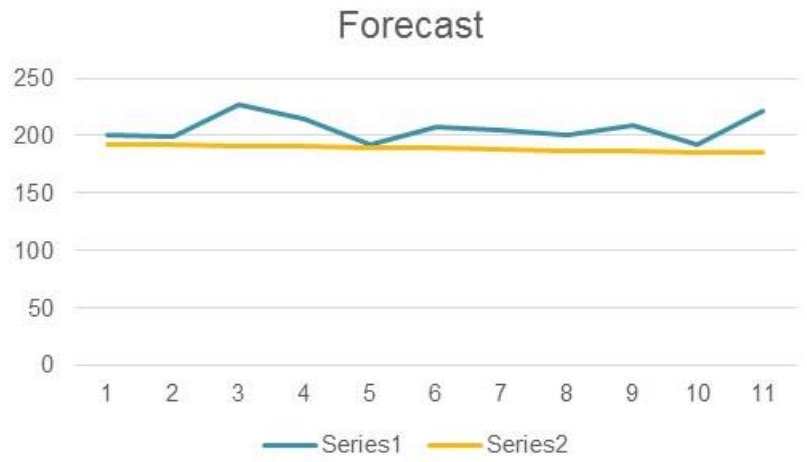


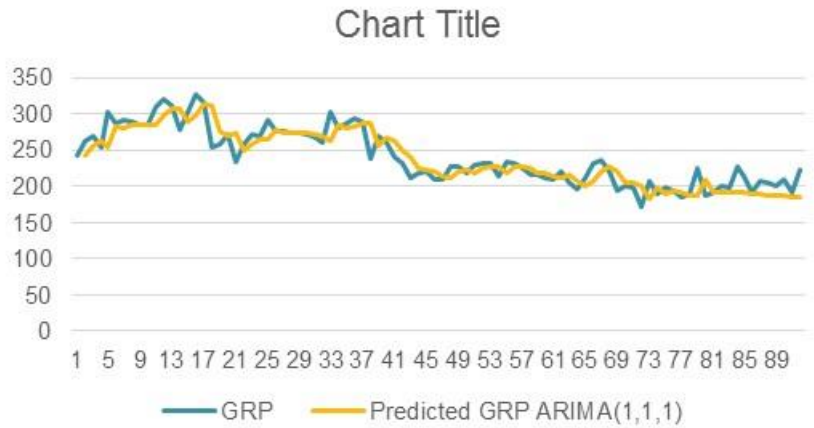




ARIMA

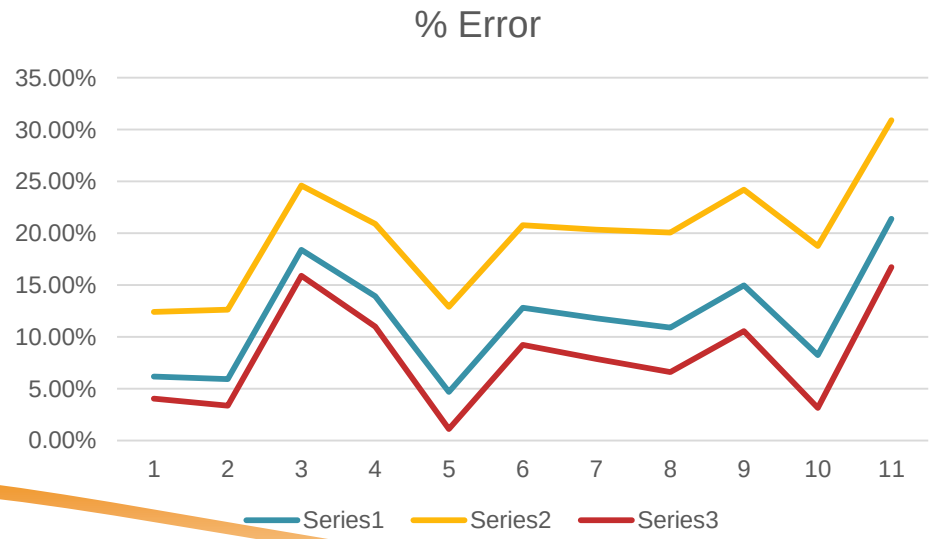






Evaluation

GRPRatingsDate	Time	GRP	Linear Pred	Quadratic Pred	Linear Error%	Quadratic Error%	Predicted ARIMA (1,1,1)	ARIMA Error%
04-Jan-2009 (2)	82	200.88	188.503	175.971	6.16%	12.40%	192.8092862	4.02%
11-Jan-2009 (3)	83	198.88	187.112	173.799	5.92%	12.61%	192.1874529	3.37%
18-Jan-2009 (4)	84	227.61	185.721	171.609	18.40%	24.60%	191.4129194	15.90%
25-Jan-2009 (5)	85	214.15	184.33	169.401	13.92%	20.90%	190.6085347	10.99%
01-Feb-2009 (6)	86	191.91	182.939	167.175	4.67%	12.89%	189.7983145	1.10%
08-Feb-2009 (7)	87	208.17	181.548	164.931	12.79%	20.77%	188.9869534	9.22%
15-Feb-2009 (8)	88	204.2	180.157	162.669	11.77%	20.34%	188.1753694	7.85%
22-Feb-2009 (9)	89	200.61	178.766	160.389	10.89%	20.05%	187.3637417	6.60%
01-Mar-2009 (10)	90	208.56	177.375	158.091	14.95%	24.20%	186.5521056	10.55%
08-Mar-2009 (11)	91	191.74	175.984	155.775	8.22%	18.76%	185.7404677	3.13%
15-Mar-2009 (12)	92	222.07	174.593	153.441	21.38%	30.90%	184.9288296	16.72%



Series 1 – Linear
Series 2 – Quadratic
Series 3 - ARIMA

Equation	R Square
Linear	.715
Quadratic	.727