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Problem Set 4

6. The acf didn't converge to zero and had a wave with a period of about 12 which suggests seasonal data. I selected a seasonal ARMA(1,1) model after analyzing the acfs which gives the following predicted data.

```
$pred
Time Series:
Start = 265
End = 288
Frequency = 1
 [1] 9.909146 9.884605 9.889792 9.883664 9.897868 9.924921 9.930791 9.925473 9.924464 9.872422 9.846100 9.846692 9.839323
[14] 9.829876 9.820792 9.812058 9.803658 9.795582 9.787816 9.780348 9.773167 9.766263 9.759623 9.753239

$se
Time Series:
Start = 265
End = 288
Frequency = 1
 [1] 0.03361900 0.05154893 0.06379063 0.07331282 0.08112884 0.08773837 0.09343460 0.09840854 0.10279363 0.10668795
[11] 0.11016631 0.11328750 0.12105750 0.12897773 0.13589084 0.14198369 0.14739336 0.15222431 0.15655854 0.16046195
[21] 0.16398848 0.16718302 0.17008339 0.17272181

>
```

8.

Residuals:

Min	1Q	Median	3Q	Max
-20.4627	-0.5214	0.0142	0.5379	11.5842

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)
M	-0.004214	0.029944	-0.141	0.8881
Tu	0.074036	0.028855	2.566	0.0103
W	0.063973	0.028836	2.219	0.0265
Th	0.006432	0.029128	0.221	0.8252
Fr	0.032896	0.029228	1.125	0.2604

The null hypothesis is that the Friday coefficient is zero. The Friday coefficient has a t value of 1.125 and p value of 0.2604. Thus, there is not enough evidence to show the Friday coefficient is significantly different from zero. So , it can be concluded there isn't a Friday effect.

```
power6 = read.table("power6.txt", header = F)
pow = power6[, 1]

Box.test(pow, lag=24, type = 'Ljung')
acf(pow)
pacf(pow)
acf(diff(pow))
pacf(diff(pow))
acf(diff(pow, 12))
pacf(diff(pow, 12))

m1 = arima(pow, order = c(1, 0, 1), seasonal = list(order = c(0, 0, 1), period = 12))
m1
tsdiag(m1, gof = 36)
predict(m1, 24)
```

```
ibmsp = read.table("d-ibm3dxwkdays8008.txt", header =T)
sp = ibmsp$sp * 100

M = ibmsp$M
Tu = ibmsp$T
W = ibmsp$W
Th = ibmsp$R
Fr = ibmsp$F

m1 = lm(sp ~ M + Tu + W + Th + Fr + 0)
summary(m1)
Box.test(m1$residuals, lag = 12, type = 'Ljung')
acf(m1$residuals)
pacf(m1$residuals)
```