1,(a):No.

H0:B=1 versus Ha:B<1

At first, by AIC, we find the order is 11.

Then by augmented Dickey-Fuller unit root test, we get the p-value is 0.04, which is smaller than 0.05. So reject the null hypothesis. So B<1.

(b):

$$x_t = 5.7442 + 0.9998x_{t-1} + 0.2135x_{t-2} - 0.0639x_{t-3} - 0.0644x_{t\text{-}4} - 0.1021x_{t-6}$$

Since Q(12)=7.8941 , P-value=0.34 with 7 freedom.So the null hypothesis of no residual serial correlation in the first 12 lags is barely not rejected at the 5% level. So this model is adequacy.

This is the predict value 0.1976, 0.2795, 0.3682, 0.4562 for the next four terms.

(c)

Since the roots include 6 different complex value. So we could not use the formula to get the cycles.

Code:

```
library(fUnitRoots)
da=read.table('D:/timeseries/m-unrate-4811.txt',header=T)[,1]
head(da)
m1=ar(da,method='mle')
m1$order
adfTest(da,lags=11,type=("ct"))
m2=arima(da,order=c(6,0,0),fixed=c(NA,NA,NA,NA,0,NA,NA))
m2
Box.test(m2$residuals,lag=12,type='Ljung')
pv=1-pchisq(7.89,7)
pv

predict(m2,4)

p1=c(1,-m2$coef[1:6])
r1=polyroot(p1)
r1
```