**Tutorial set #3**

**Question 1:**

Write the Yule-Walker equations for every model of the following, where $ε\_{t\~}i.i.d\left(0,σ\_{ε}^{2}\right)$ :

1. $y\_{t}=0.5y\_{t-1}+ε\_{t}$
2. $y\_{t}=1.2 y\_{t-1}-0.7 y\_{t-2}+ε\_{t}$
3. find $ ρ\_{1}, ρ\_{2} , ϕ\_{kk}$ for the models in (1) and (2).

**Question 2:**

Assume $ε\_{t\~}i.i.d\left(0,σ\_{ε}^{2}\right)$ , and let the observed series be defined as $y\_{t}=ε\_{t}-θε\_{t-1}$

Where the parameter $θ$ can take either the value $θ=3$ or $θ=\frac{1}{3}$.

1. Find the autocorrelation function of the series $\left\{Y\_{t}\right\}$ for both cases, compare them.
2. Is the process $\left\{Y\_{t}\right\}$ stationary in both cases?
3. For simplification, assume that the mean of the process $\left\{Y\_{t}\right\}$ equal zero, and the variance is equal to one, and that you obtained the observed series $\left\{Y\_{t}\right\}$ for $t=1,2,…,n$, and that you have obtained a credible estimates for the coefficients of the ACF $ρ\_{k}$, can you tell which process generated the data (i.e. which value $θ=3$ or $θ=\frac{1}{3}$ to be used in the model to model the data?)

**Question 3:** Write the following models using the backshift operator B:

1. $y\_{t}-0.5 y\_{t-1}=ε\_{t}$ :
2. $y\_{t}=ε\_{t}-1.3 ε\_{t-1}+0.4 ε\_{t-2}$
3. $y\_{t}-0.5 y\_{t-1}=ε\_{t}-1.3 ε\_{t-1}+0.4 ε\_{t-2}$

**Question 4:**

Express the following models in terms of the process $\left\{y\_{t}\right\}$ and $\left\{ε\_{t}\right\}$:

1. $∇^{3}y\_{t}=∇ε\_{t}$
2. $∇^{2}y\_{t}=∇^{3}ε\_{t}$

**Question 5:**

Open the MINITAB program, and get acquainted with following icons:

1. The icon for “Time series Plot”.
2. The icon for “Differences”.
3. The icon for “lag”.
4. The icon for “Autocorrelation function”.
5. The icon for “Partial Autocorrelation function”.