PSTAT174_Lab02

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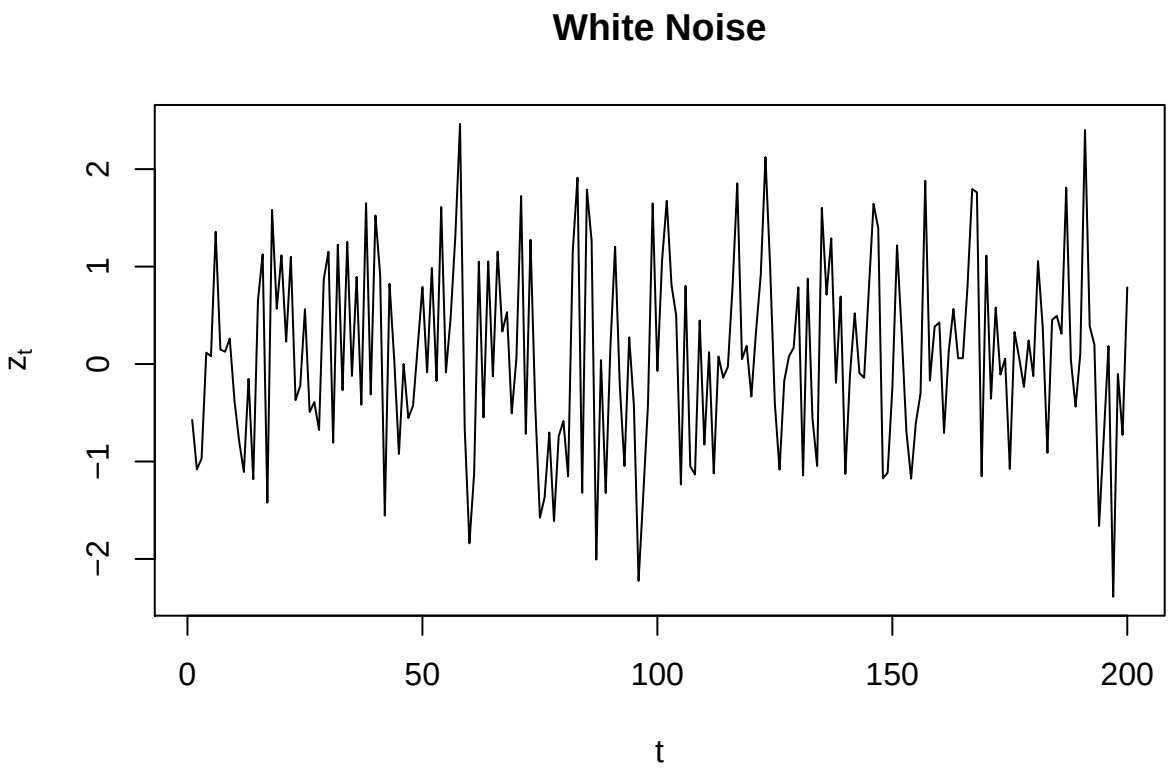
(1) What is the definition of a white-noise process? Does it have to be Gaussian?

Z_t are mean zero, constant variance and uncorrelated. The instance of Gaussian is a special case for White Noise. Therefore White Noise does not need to be Gaussian.

(2) In Lab 2 question 2 Moving averages, what is the difference of y_t and x_t in the plot? What does this difference suggest about Moving Average as a data processing technique? Plot the acf of yt in question 2.

x_t is known to equal z_t in this instance, where as y_t in this example is known to be the average of the previous,current and next (As stated in Lab 2 (#2)). The difference about the Moving Average as a data processing technique is that it takes the average of the analyzed points by creating a series of averages.

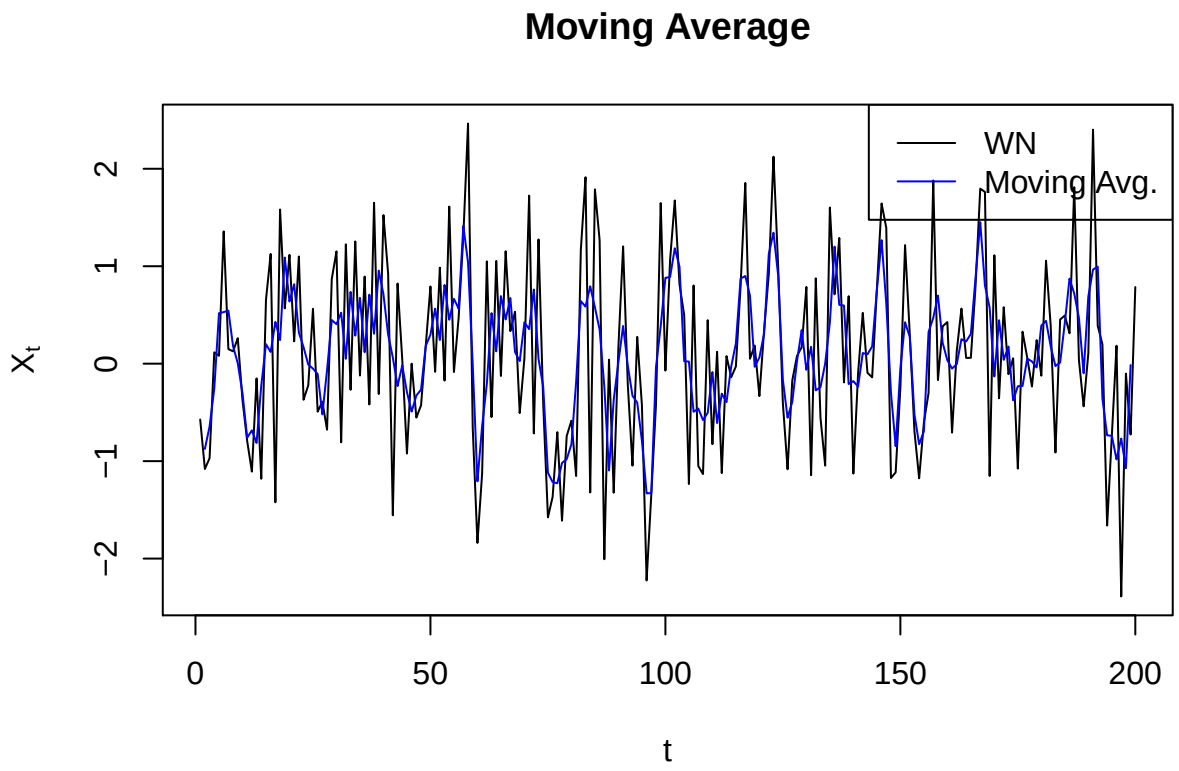
```
z_t <- rnorm(200,0,1)
plot(z_t,xlab = "t",ylab = expression(z[t]),type = "l",main = "White Noise")
```



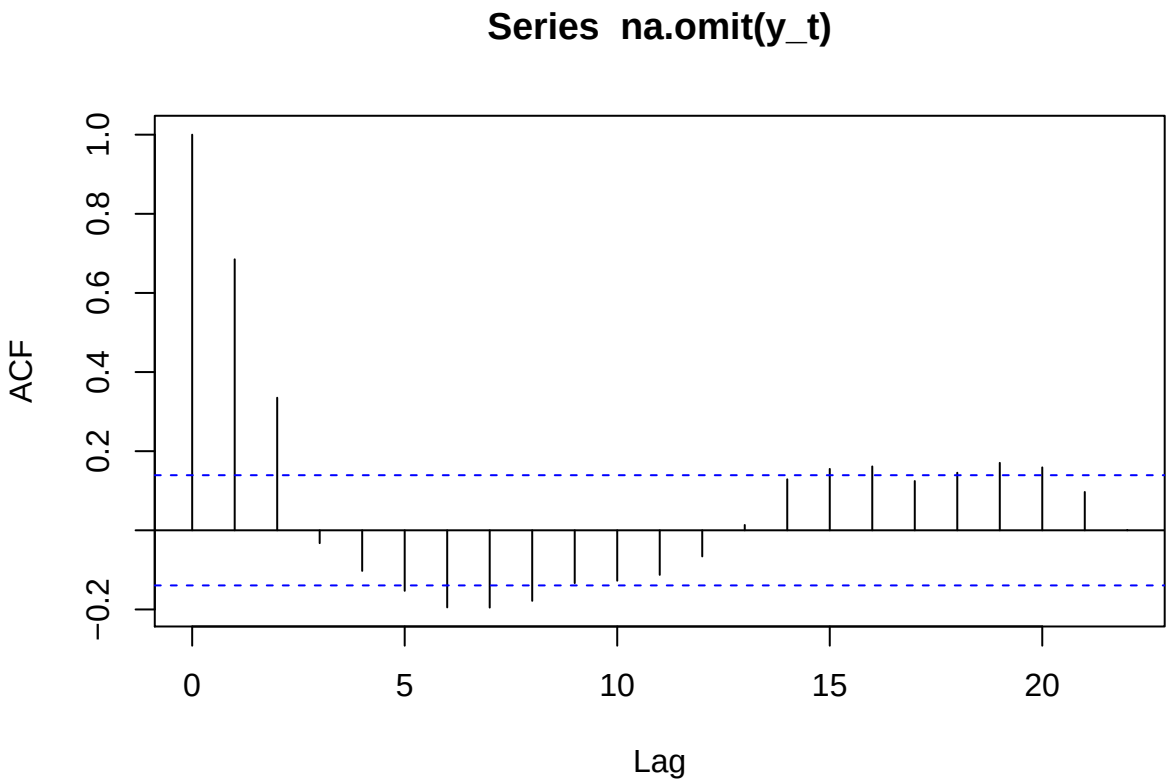

```
y_t = filter(z_t, filter = rep(1/3,3), sides = 2, method = "convolution")
# Plot of white-noise
plot(z_t,xlab = "t",ylab = expression(X[t]),type = "l",main = "Moving Average") # Plot of moving-averag
```

```r
lines(y_t,col = "blue")

# Add legend
legend("topright",c("WN", "Moving Avg."),col = c("black","blue"),lty = 1)
```



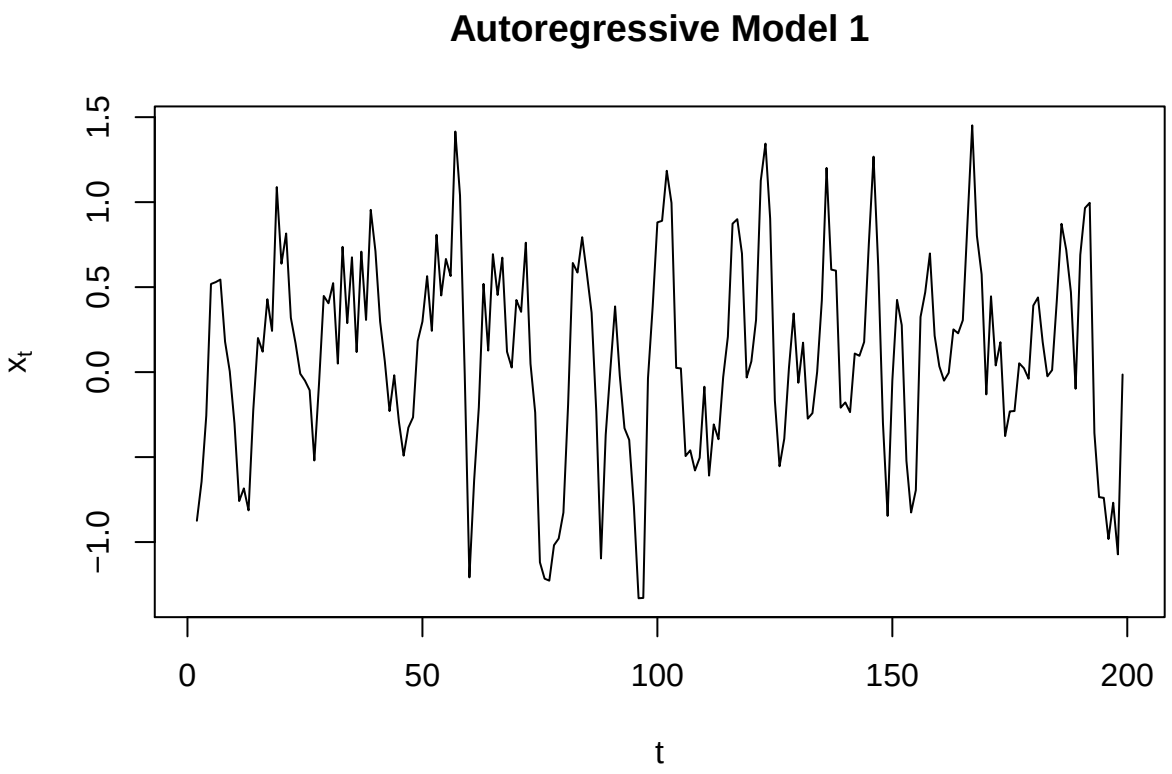

```r
acf(na.omit(y_t))
```



(3) Simulate an AR model using two different ways you learned from Lab 2.

```
#First way
y_t = filter(z_t, filter = rep(1/3,3), sides = 2, method = "convolution")

plot(y_t,xlab = "t",ylab = expression(x[t]),type = "l", main = "Autoregressive Model 1")
```




```r
theta <- rep(1/3,3)
y_u <- arima.sim(n = 200,model = list(ma=theta))
plot(y_u, xlab = "t",ylab = expression(y[t]),type = "l", main = "Autoregressive Model 2")
```