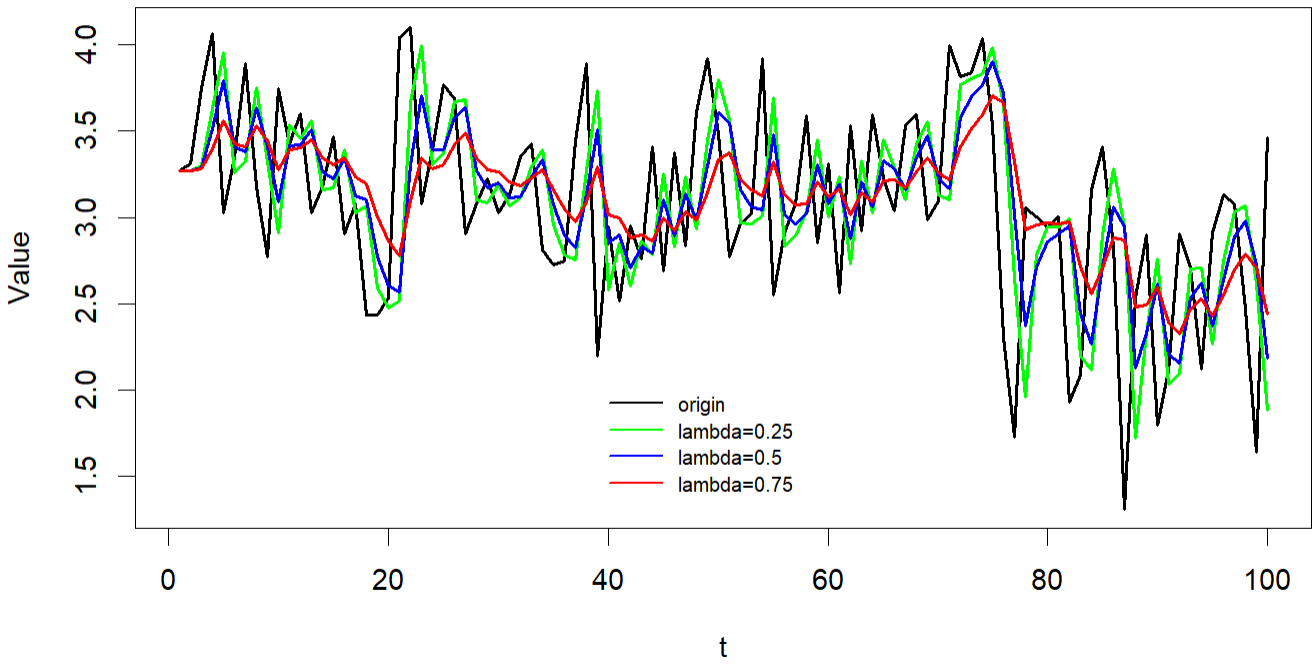
Pb 3.30

3.30 For the logarithm of the glacial varve data, say, x_t, presented in Example 3.33, use the first 100 observations and calculate the EWMA, $\tilde{x}_{t+1}^t$, given in (3.151) for $t = 1, \ldots, 100$, using $\lambda = .25, .50$, and $.75$, and plot the EWMAs and the data superimposed on each other. Comment on the results.

```r
library(astsa)
n <- 100
x <- c(log(varve[1:n]))
# 预测
EWMA <- function(x,lambda){
   xhat=x[1]
   for(i in 2:n){xhat=c(xhat,lambda*tail(xhat,1)+(1-lambda)*x[i-1])}
   return(xhat)
}
lambda <- c(.25, .5, .75)
xhat1 <- EWMA(x,lambda[1])
xhat2 <- EWMA(x,lambda[2])
xhat3 <- EWMA(x,lambda[3])
# 画图
plot.ts(x,col='black',lwd=2,ylab='Value',xlab='t',main='各水平曲线对比')
lines(xhat1,col='green',lwd=2)
lines(xhat2,col='blue',lwd=2)
lines(xhat3,col='red',lwd=2)
legend('bottom', inset=.01,bty='n',
legend=c("origin","lambda=0.25","lambda=0.5",'lambda=0.75'),cex=0.7,col=c('black','green','blue','red'),lwd=c(1.5,1.5,1.5,1.5),x.intersp = 0.6,y.intersp = 0.5)
```



观察发现，λ 越大则过去的预测值所占的权重就越高，预测值受最近样本的影响就越小，曲线也就越平滑。