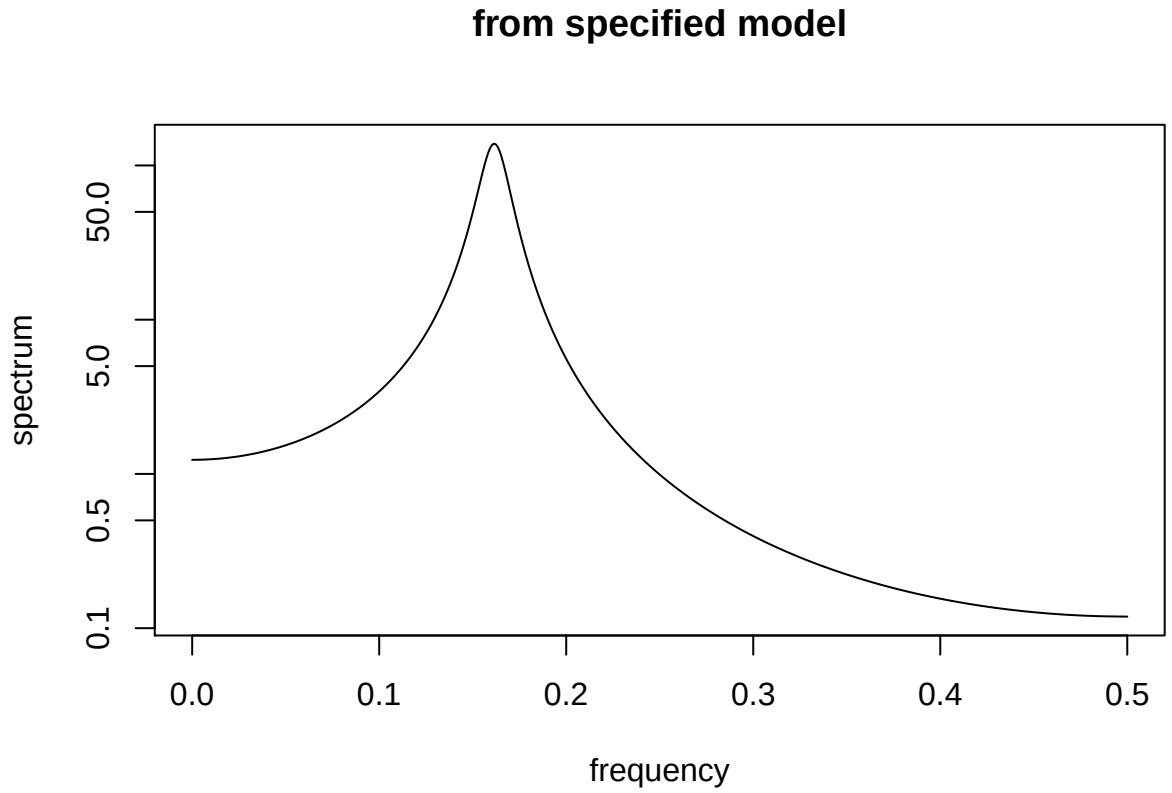
Stat153_hw6

1

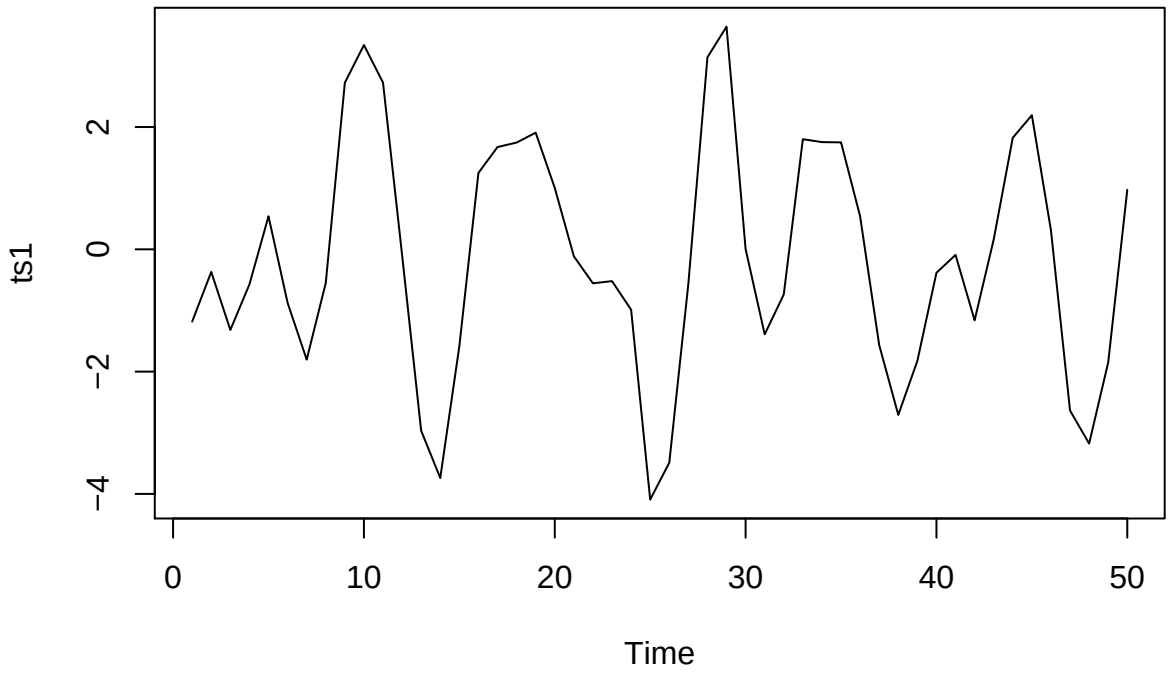
```
#(a)
library(astsa)
```

```
## Warning: package 'astsa' was built under R version 3.4.3
```

```
arma.spec(ar=c(1,-0.9),ma=0,var.noise=1)
```

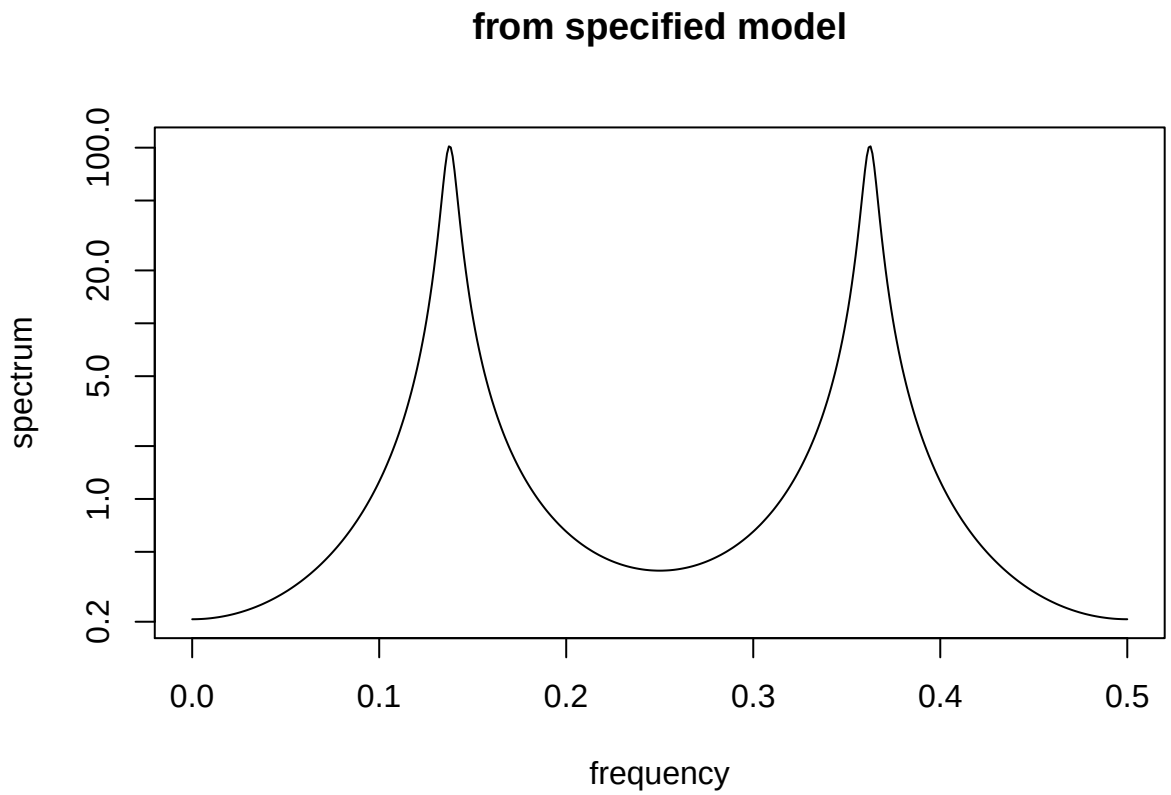



```
#f=0.17 is dominant
#simulation
z=rnorm(50,0,1)
ts1=arima.sim(n = 50, list(ar = c(1,-0.9),ma = 0), sd = sqrt(1))
plot(ts1)
```



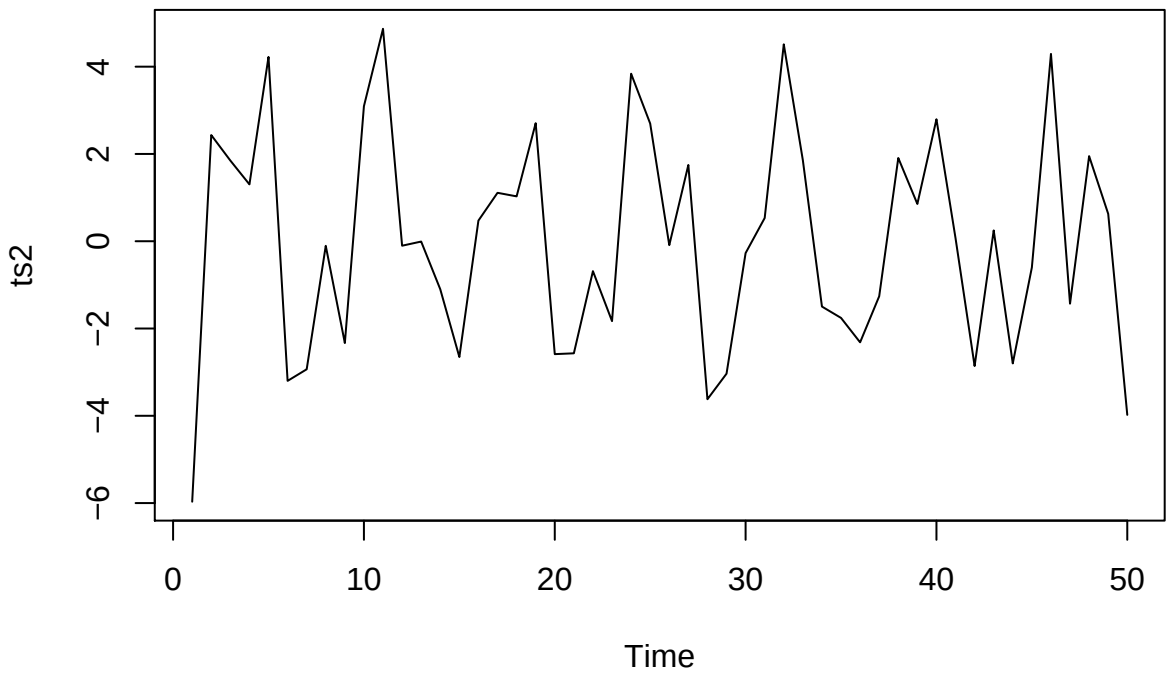

```r
#the time series has a period of approximate 6, which is exactly the inverse of the frequency observed


#(b)
arma.spec(ar=c(0,-0.3,0,-0.9),ma=0,var.noise=1)
```



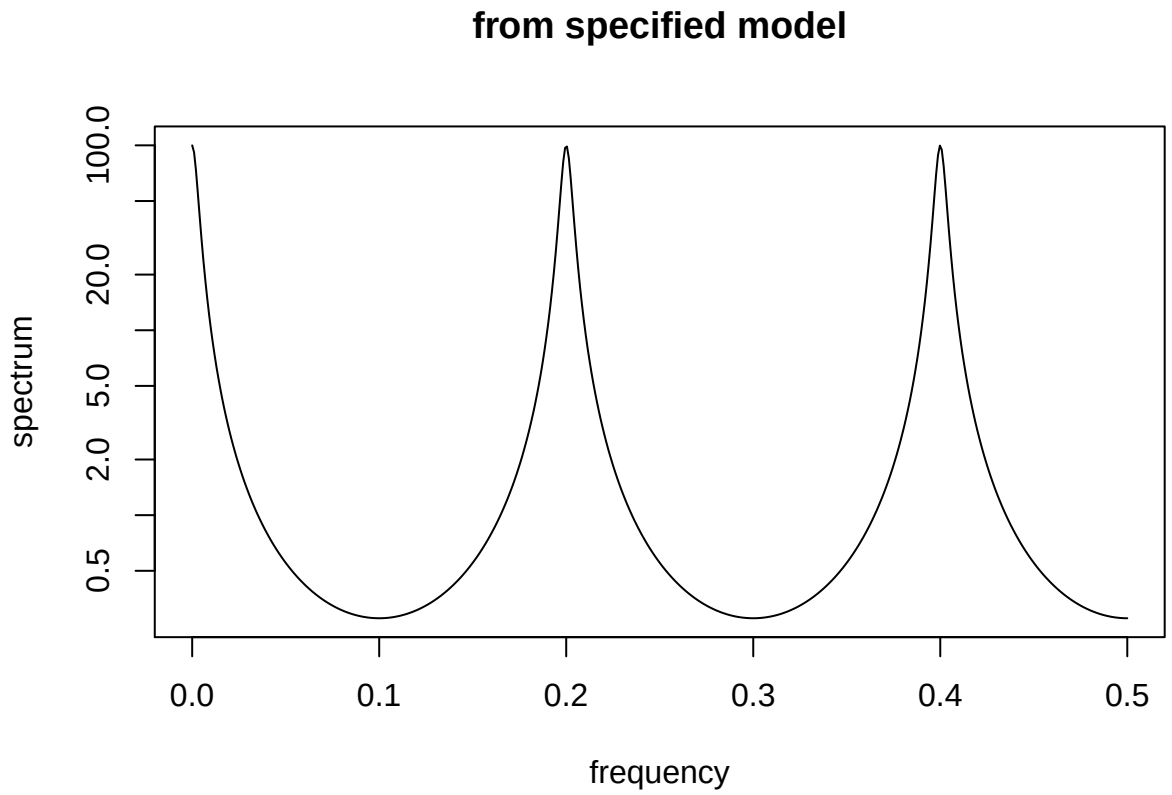

```r
#dominant frequency is 0.13,0.38
#simulation
```

```r
z=rnorm(50,0,1)
ts2=arima.sim(n=50,list(ar=c(0,-0.3,0,-0.9),ma=0),sd=1)
plot(ts2)
```

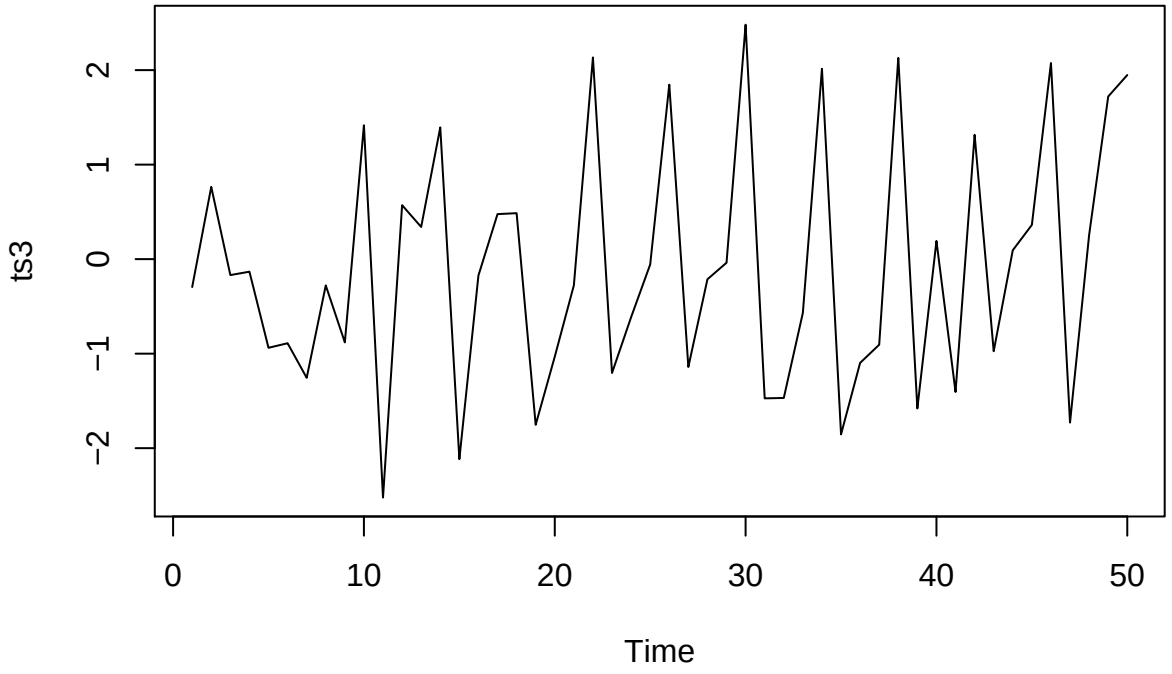



```r
#the time series has a period of approximate 8.3(inverse of 1/0.13), Within one period, there is a sub-p


#(c)
arma.spec(ar=c(0,0,0,0,0.9),ma=0,var.noise=1)
```



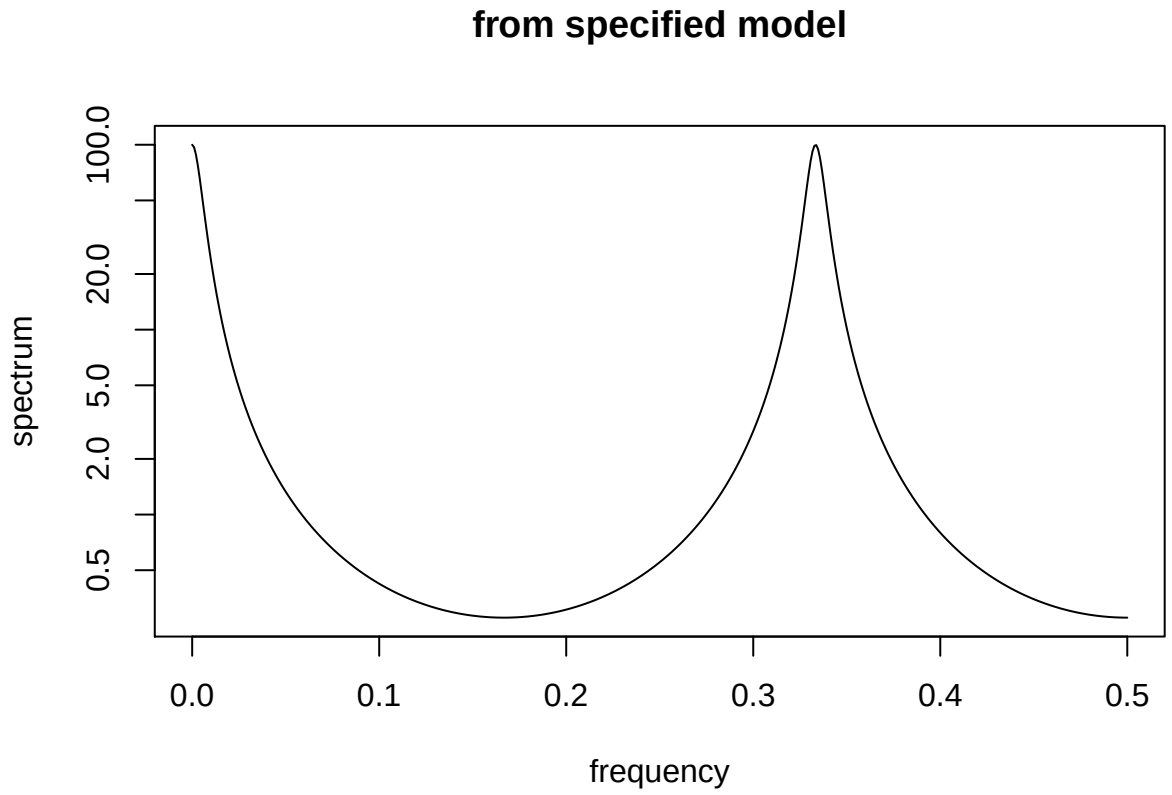

```
#dominant frequency is 0,0.2,0.4
#simulation
z=rnorm(50,0,1)
ts3=arima.sim(n=50,list(ar=c(0,0,0,0.9),ma=0),sd=1)
plot(ts3)
```



```
#the time series has a period of approximate 5(inverse of 0.2),within one period, there is a sub period
```

2.Spectral density of AR process

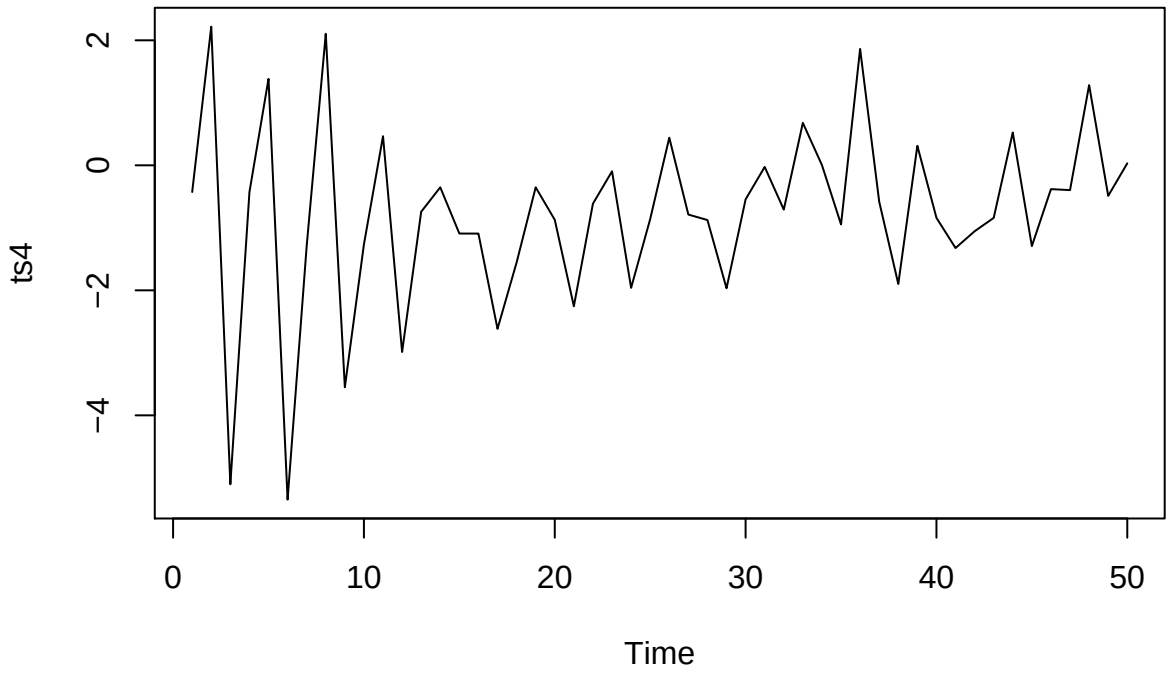
```
#(a)see written part
#(b)
arma.spec(ar=c(0,0,0.9),ma=0,var.noise=1)
```



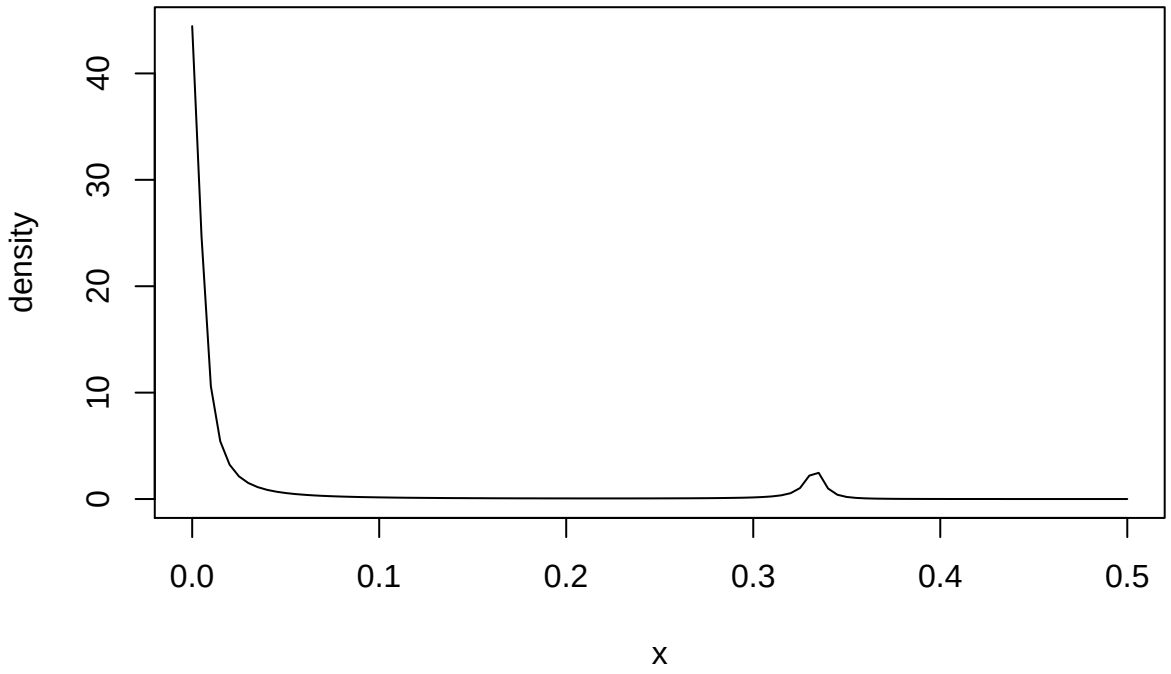

```
#from the plot. Xt oscillates. with period of 1/0.33
period=1/0.33
period
```

```
## [1] 3.030303
```

```
#(c)
ts4=arima.sim(n = 50, list(ar = c(0,0,0.9),ma = 0), sd = sqrt(1))
plot(ts4)
```



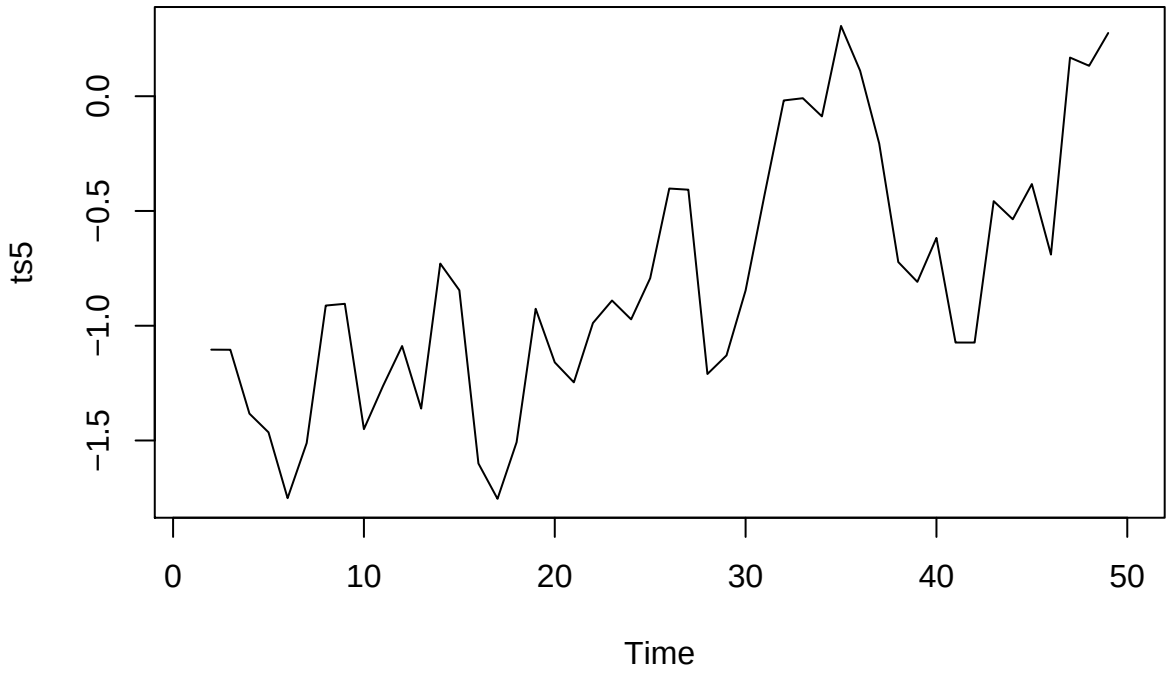

```
#the simulation does have a consistant result with my answer in (b)
#(e)
density=function(x){
  y=(1/9*cos(2*pi*x)^2+2/9*cos(2*pi*x)+1/9)/(1.81-1.8*cos(6*pi*x))
  return(y)
}
plot.function(density,n=101,xlim=c(0,1/2))
```




```
#No, I do not think yt will oscillate, since there is no obvious dominant period. Or in another word, d

#(f)
```

```r
ts5=filter(ts4,rep(1/3,3),sides=2,method='convolution')
plot(ts5)
```




```r
#After comparision, we find out that result in (f) is consistent with result in (d). Since there is no
```