# Series Tiempo Estacionarias

Eduardo Alvarado Gómez

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## Introducción a series de tiempo

```
t = c(1,2,3,4,5,6,7,8,9,10,11,12)
y = c(17, 21, 19, 23, 18, 16, 20, 18, 22, 20, 15, 22)
n = 12
```

### Métodos de suavizamiento

*Promedios móviles*

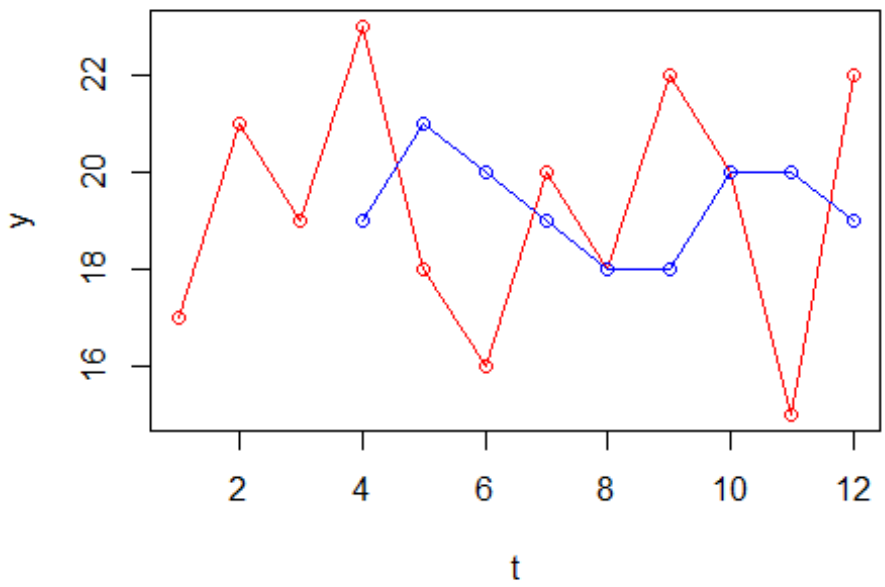
```
p = NA
e = NA
for(i in 1:(n-3)){
  p[i+3] = (y[i]+y[i+1]+y[i+2])/3;
  e[i+3] = p[i+3] -y[i+3]
  }

T=data.frame(t,p,y,e^2)
CME=mean(e^2,na.rm=TRUE)
T
```

```
##     t  p  y e.2
## 1   1 NA 17  NA
## 2   2 NA 21  NA
## 3   3 NA 19  NA
## 4   4 19 23  16
## 5   5 21 18   9
## 6   6 20 16  16
## 7   7 19 20   1
## 8   8 18 18   0
## 9   9 18 22  16
## 10 10 20 20   0
## 11 11 20 15  25
## 12 12 19 22   9
```

```
cat("El CME para promedio móvil (n = 3) es de",CME)
```

```
## El CME para promedio móvil (n = 3) es de 10.22222
```

```
plot(t, y, type="o", col="red")
x = (3+1):n
lines(x,p[x],type="o",col="blue")
```



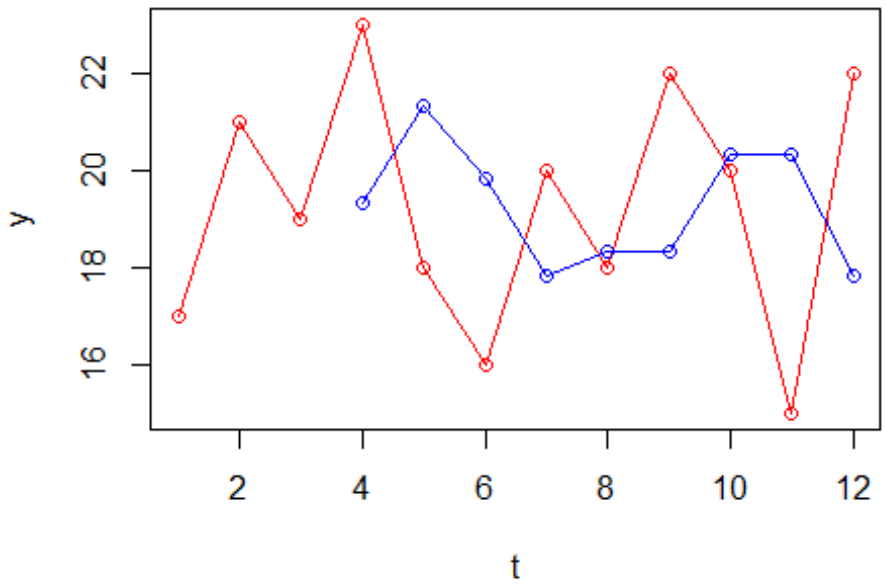

*Promedios móviles ponderados*

```
p2 = NA
e2 = NA
for(i in 1:(n-3)){
  p2[i+3]=(1/6)*y[i]+(2/6)*y[i+1]+(3/6)*y[i+2];
  e2[i+3] = p2[i+3] - y[i+3]
  }

T2 = data.frame(t,p2,y,e2^2)
CME2 = mean(e2^2,na.rm=TRUE)
T2
```

```
##     t       p2  y       e2.2
## 1   1       NA 17         NA
## 2   2       NA 21         NA
## 3   3       NA 19         NA
## 4   4 19.33333 23 13.4444444
## 5   5 21.33333 18 11.1111111
## 6   6 19.83333 16 14.6944444
## 7   7 17.83333 20  4.6944444
## 8   8 18.33333 18  0.1111111
## 9   9 18.33333 22 13.4444444
## 10 10 20.33333 20  0.1111111
## 11 11 20.33333 15 28.4444444
## 12 12 17.83333 22 17.3611111
```

```
cat("El CME para promedio móvil ponderado (n = 3) es de",CME2)
```

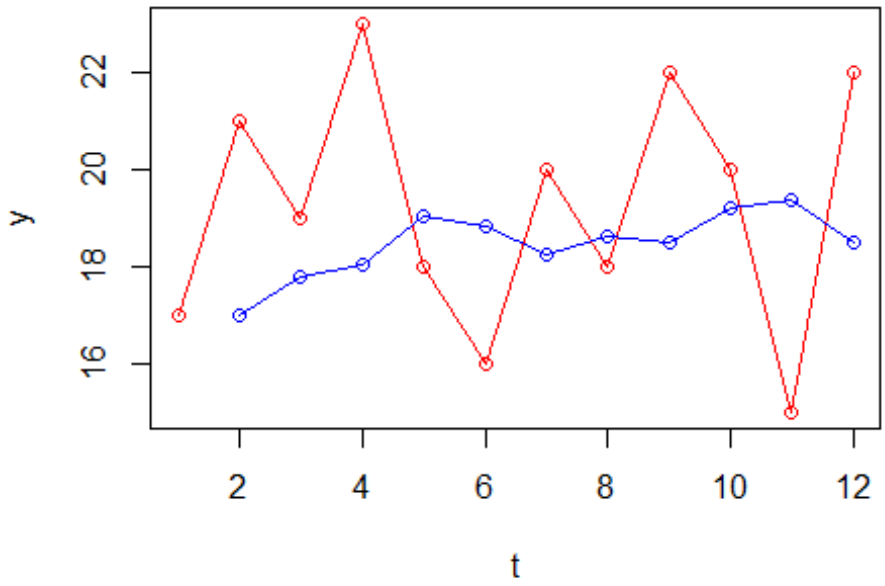
```
## El CME para promedio móvil ponderado (n = 3) es de 11.49074

plot(t, y, type="o", col="red")
lines(x,p2[x],type="o",col="blue")
```




*Método de suavizamiento exponencial*

```
p3 = NA
e3 = NA
p3[1]=y[1]
p3[2]=y[1]
a=0.20
for(i in 2:n){
  p3[i]=a*y[i-1]+(1-a)*p3[i-1];
  e3[i] = y[i]- p3[i]
  }

T3 = data.frame(t,p3,y,e3^2)
CME3 = mean(e3^2,na.rm=TRUE)
T3

##    t       p3  y       e3.2
## 1  1 17.00000 17         NA
## 2  2 17.00000 21 16.0000000
## 3  3 17.80000 19  1.4400000
## 4  4 18.04000 23 24.6016000
## 5  5 19.03200 18  1.0650240
## 6  6 18.82560 16  7.9840154
```

```
## 7   7 18.26048 20  3.0259298
## 8   8 18.60838 18  0.3701311
## 9   9 18.48671 22 12.3432263
## 10 10 19.18937 20  0.6571279
## 11 11 19.35149 15 18.9354879
## 12 12 18.48119 22 12.3819951

cat("El CME para el suavizamiento exponencial (a =",a,") es de",CME3)

## El CME para el suavizamiento exponencial (a = 0.2 ) es de 8.982231

plot(t, y, type="o", col="red")
x=2:n
lines(x,p3[x],type="o",col="blue")
```




### Semana 13

####```{r}

t = c(1,2,3,4,5,6,7,8,9,10,11,12,13) y = c(17, 21, 19, 23, 18, 16, 20, 18, 22, 20, 15, 22) n = 12

p3 = NA e3 = NA p3[1]=y[1] p3[2]=y[1] a=0.20 for(i in 2:n+1){ p3[i]=a*y[i-1]+(1-a)*p3[i-1]; e3[i] = y[i]- p3[i] }

T3 = data.frame(t,p3,y,e3^2) CME3 = mean(e3^2,na.rm=TRUE) T3 cat("El CME para el suavizamiento exponencial (a =",a,") es de",CME3)

plot(t, y, type="o", col="red") x=2:n+1 lines(x,p3[x],type="o",col="blue")

```
```