

# Série Temporelle

Master 1 MAS Rennes - Série Temporelle

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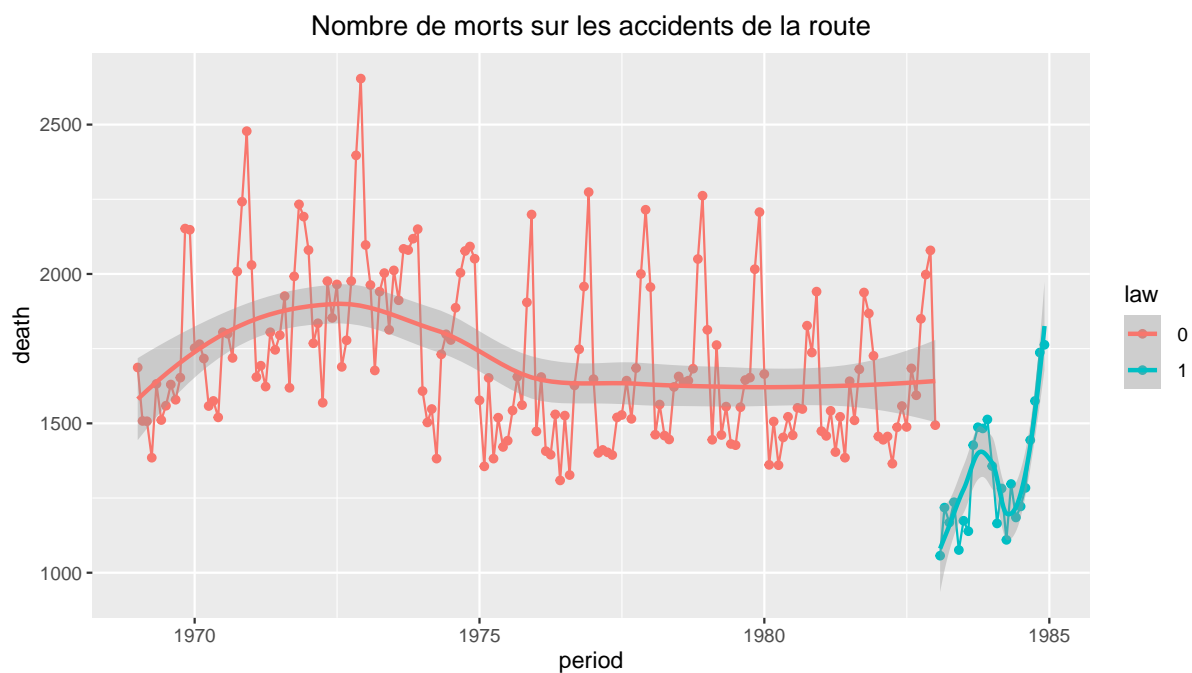
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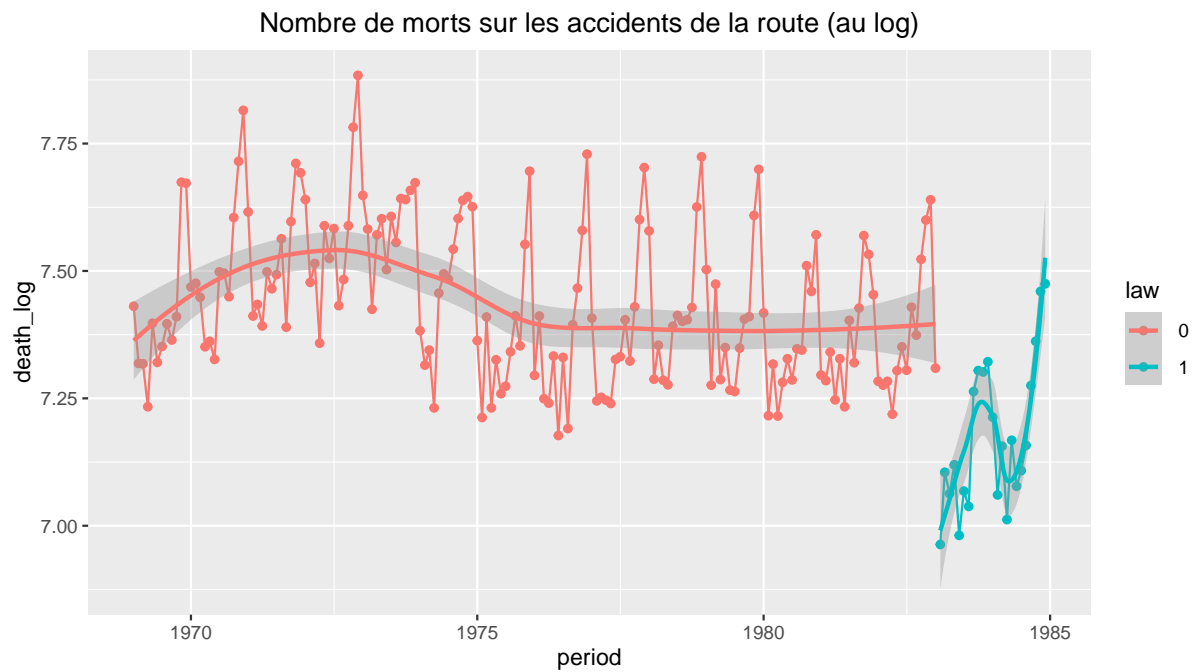
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# 1 Import des données

```
period <-  
  seq(as.Date('1969-01-01'), as.Date('1984-12-31'), by = "month")  
  
ukdeath <-  
  read_delim("../data.txt", delim = " ", col_types = "if") %>%  
  mutate(death_log = log(death),  
         period = period)
```

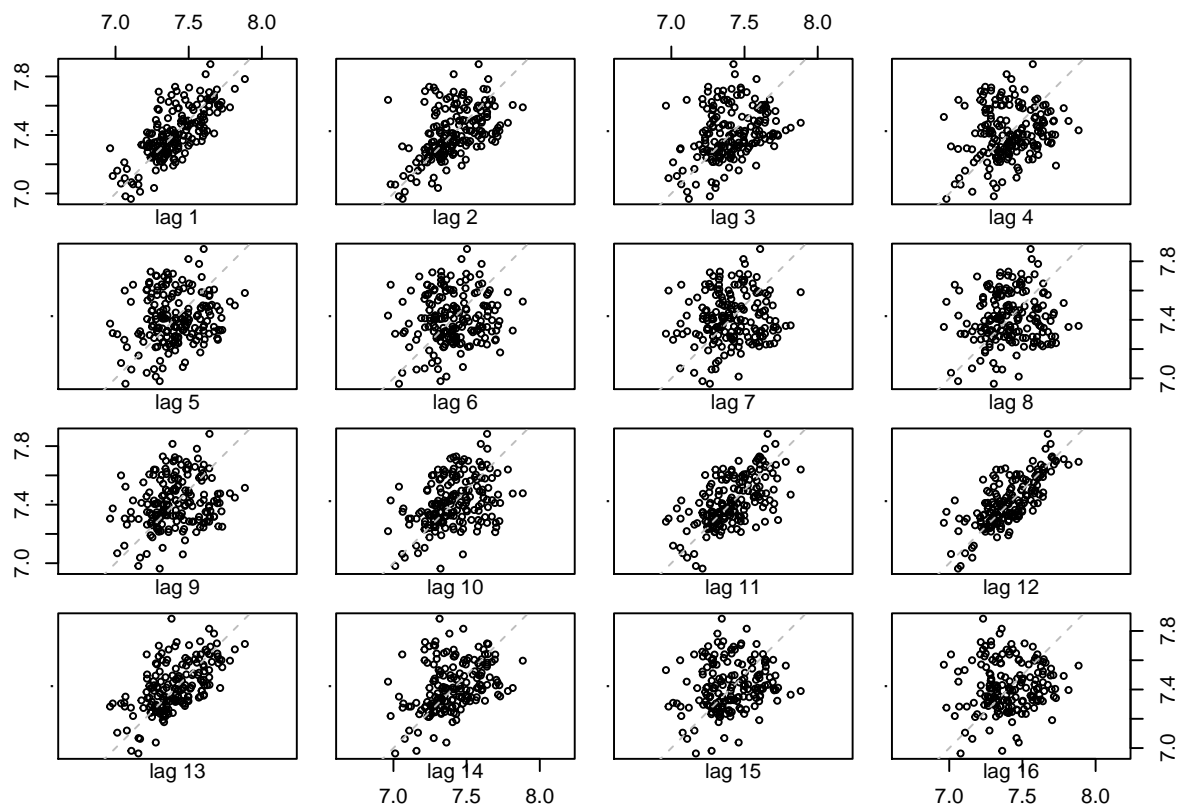
##	death	law	death_log	period
##	Min. :1057	0:169	Min. :6.963	Min. :1969-01-01
##	1st Qu.:1462	1: 23	1st Qu.:7.287	1st Qu.:1972-12-24
##	Median :1631		Median :7.397	Median :1976-12-16
##	Mean :1670		Mean :7.406	Mean :1976-12-15
##	3rd Qu.:1851		3rd Qu.:7.523	3rd Qu.:1980-12-08
##	Max. :2654		Max. :7.884	Max. :1984-12-01



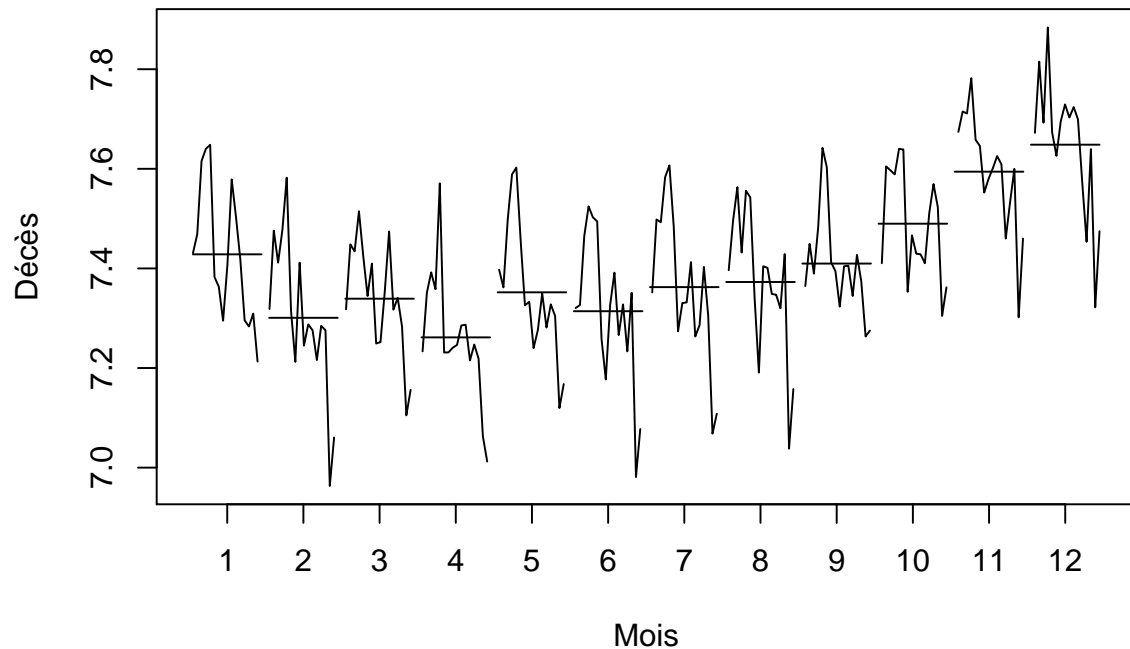


## 2 Lagplots

```
ukdeath$death_log %>% lag.plot(., lags = 16)
```



```
ukdeath$death_log %>% monthplot(., ylab = "Décès", xlab = "Mois")
```



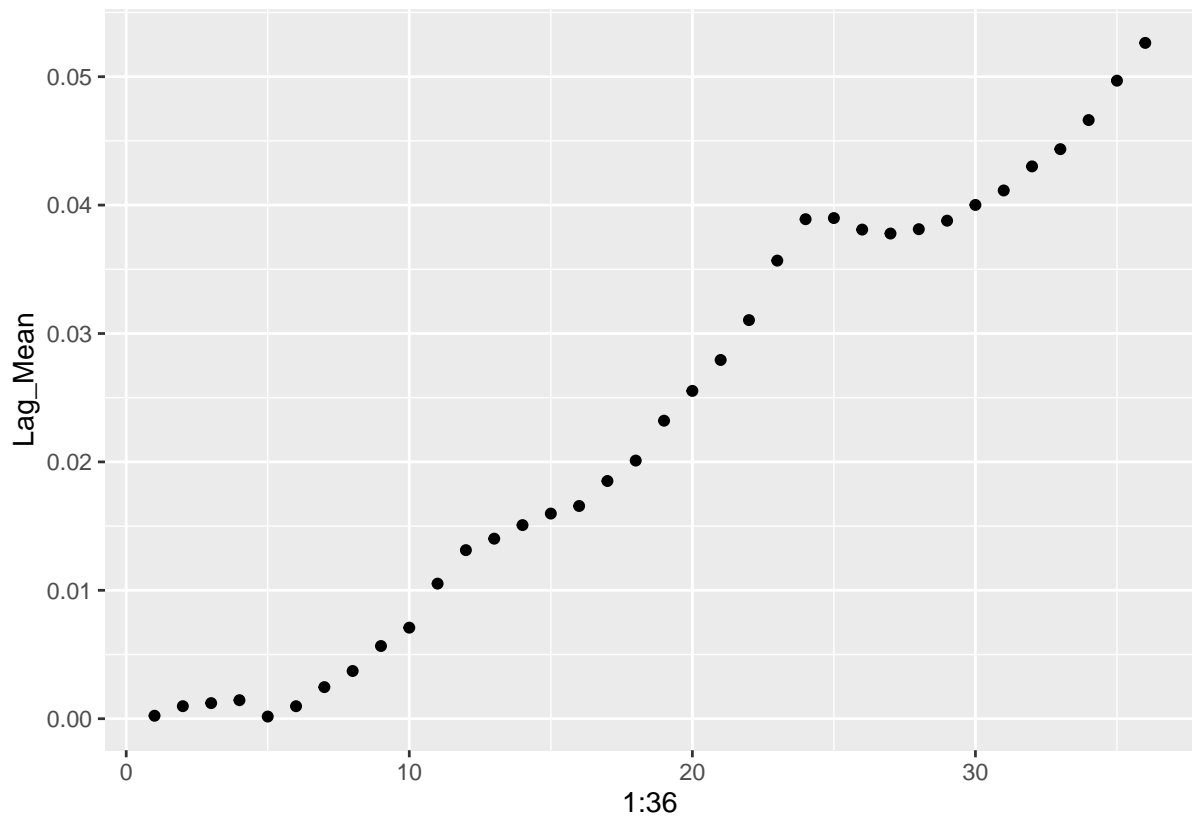
### 3 Trouver la période et le degré

#### 3.1 La période (lag)

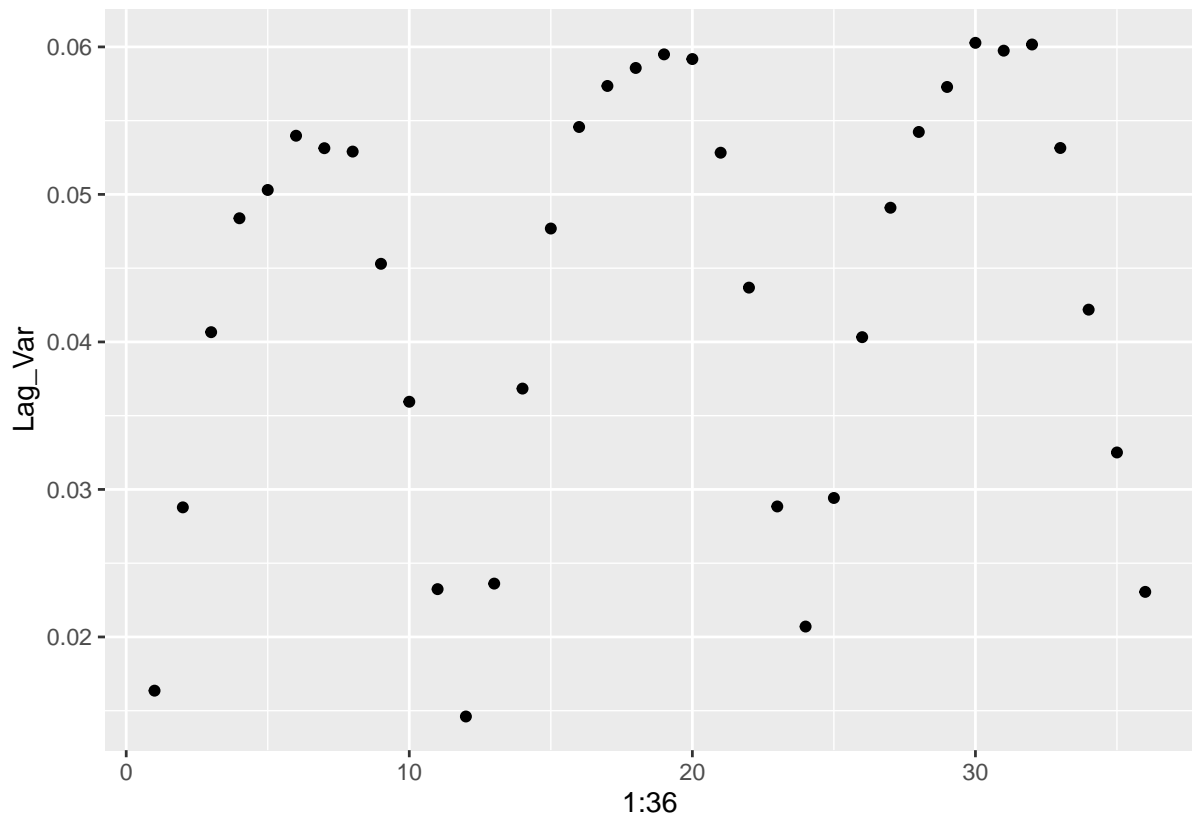
```
Lag_Mean <- NULL
Lag_Var <- NULL

for (ind in 1:36) {
  diff <- diff(ukdeath$death_log, ind, 1)
  Lag_Mean[ind] <- abs(mean(diff))
  Lag_Var[ind] <- var(diff)
}

ggplot() + aes(y = Lag_Mean, x = 1:36) + geom_point()
```



```
ggplot() + aes(y = Lag_Var, x = 1:36) + geom_point()
```

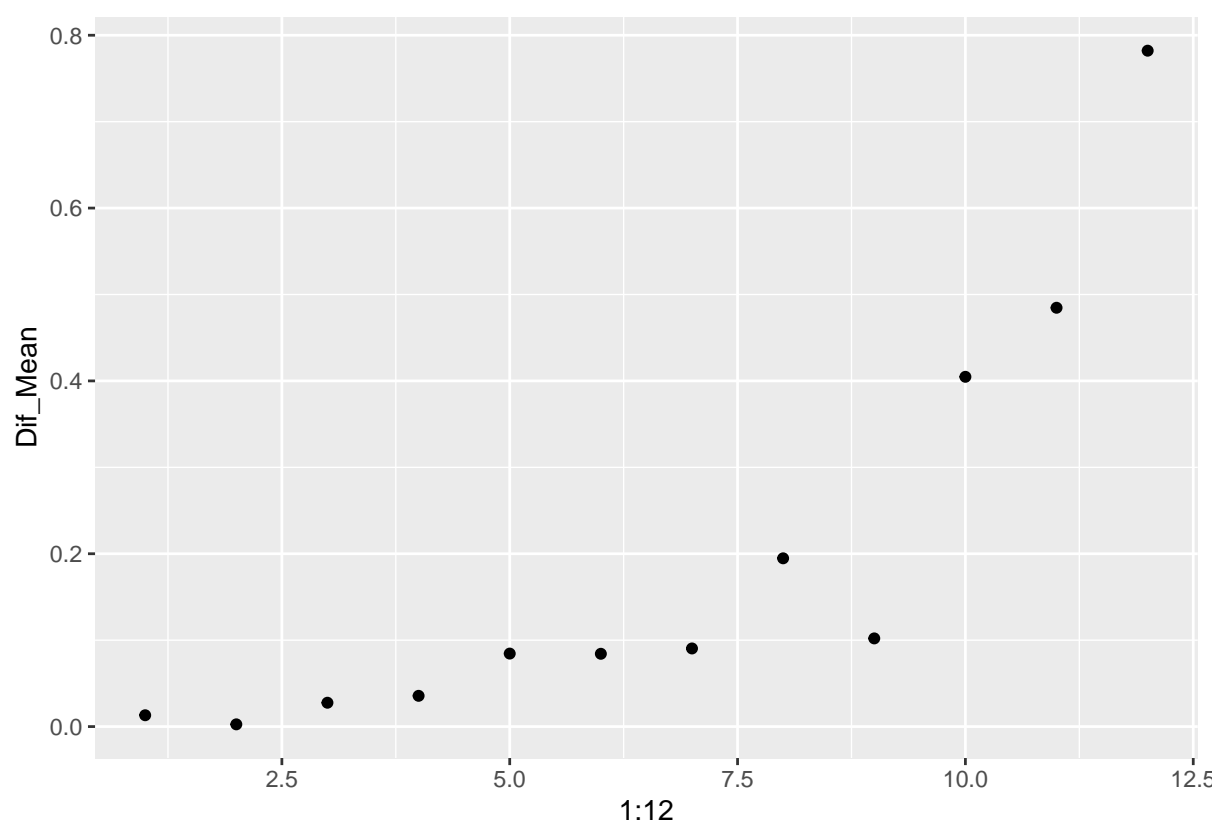


### 3.2 Le degré (differencies)

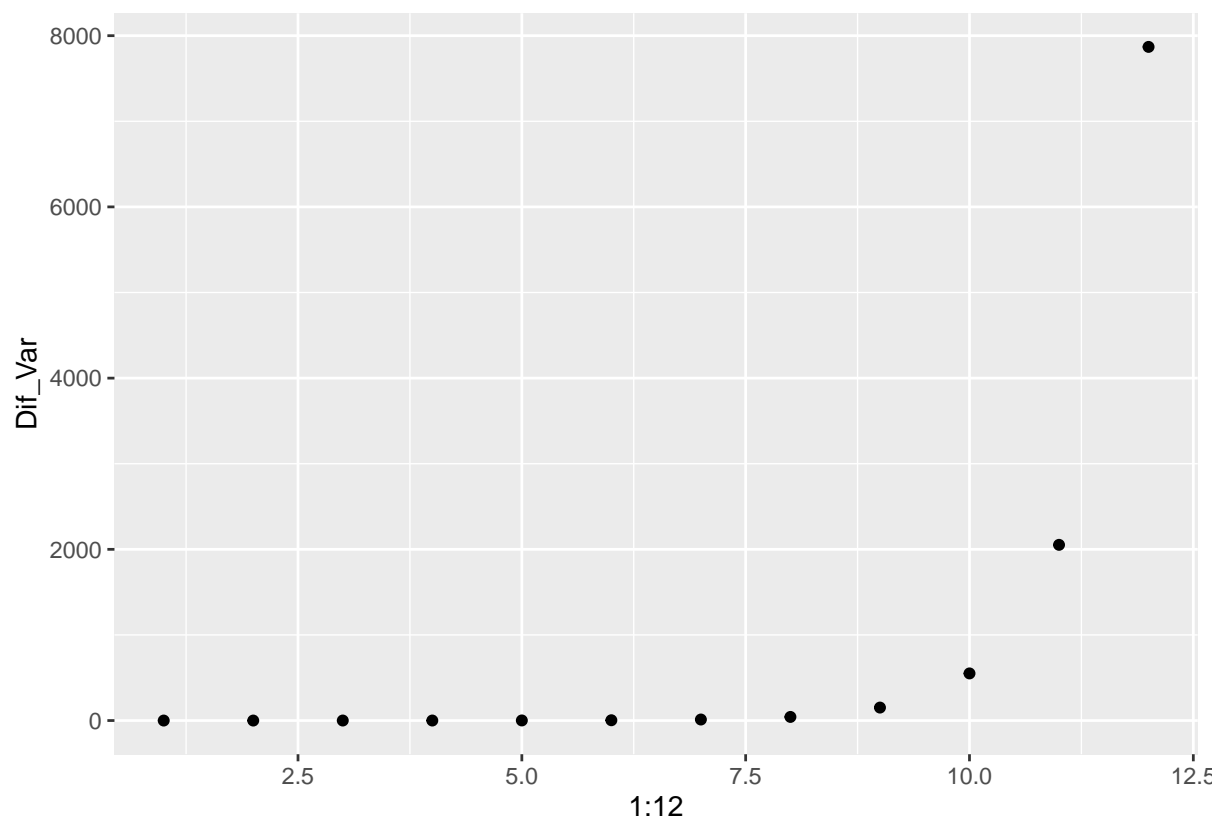
```
Dif_Mean <- NULL
Dif_Var <- NULL

for (ind in 1:12) {
  diff <- diff(ukdeath$death_log, 12, ind)
  Dif_Mean[ind] <- abs(mean(diff))
  Dif_Var[ind] <- var(diff)
}

ggplot() + aes(y = Dif_Mean, x = 1:12) + geom_point()
```



```
ggplot() + aes(y = Dif_Var, x = 1:12) + geom_point()
```

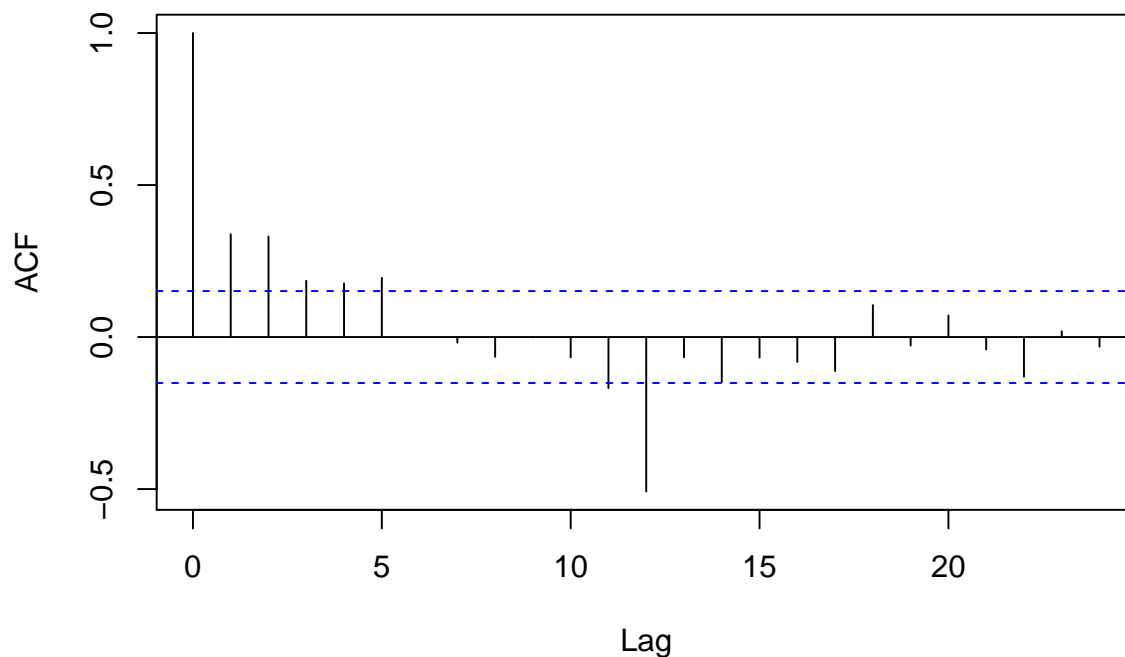


## 4 A choisir

lag : 12 diff : 1 ou 2

```
exemple <- diff(ukdeath$death_log, 12 , 2)  
acf(exemple, 24)
```

## Series exemple



## 5 Reprod

```
t <- 1:192
sinusoides <- t %o% c(rep(1:5, 2)) * pi / 6
sinusoides[, 1:5] <- sin(sinusoides[, 1:5])
sinusoides[, 6:10] <- cos(sinusoides[, 6:10])
sinusoides <- as.data.frame(sinusoides)
names(sinusoides) <-
  c(paste("sin_", 1:5, sep = ""), paste("cos_", 1:5, sep = ""))
```

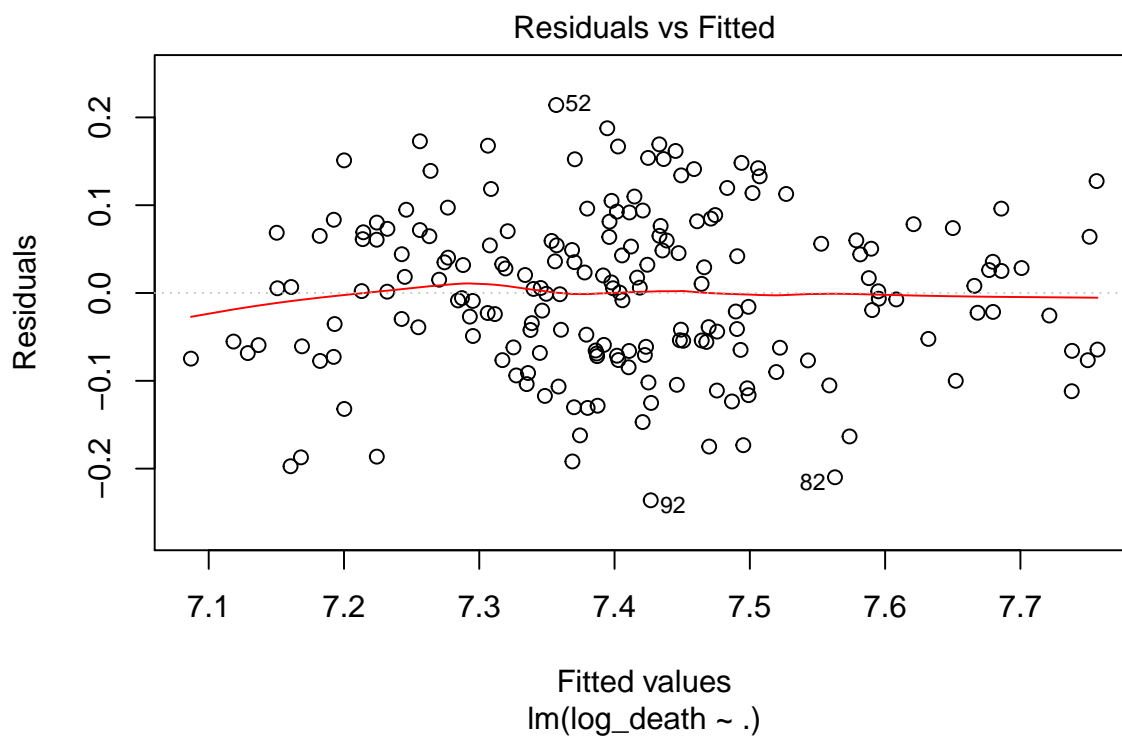
```
log_death <- ukdeath$death_log
df <- data.frame(log_death, t, t ^ 2, t ^ 3)
df <- cbind(df, sinusoides)
ModAddifitf <- lm(data = df, log_death ~ .)
summary(ModAddifitf)
```

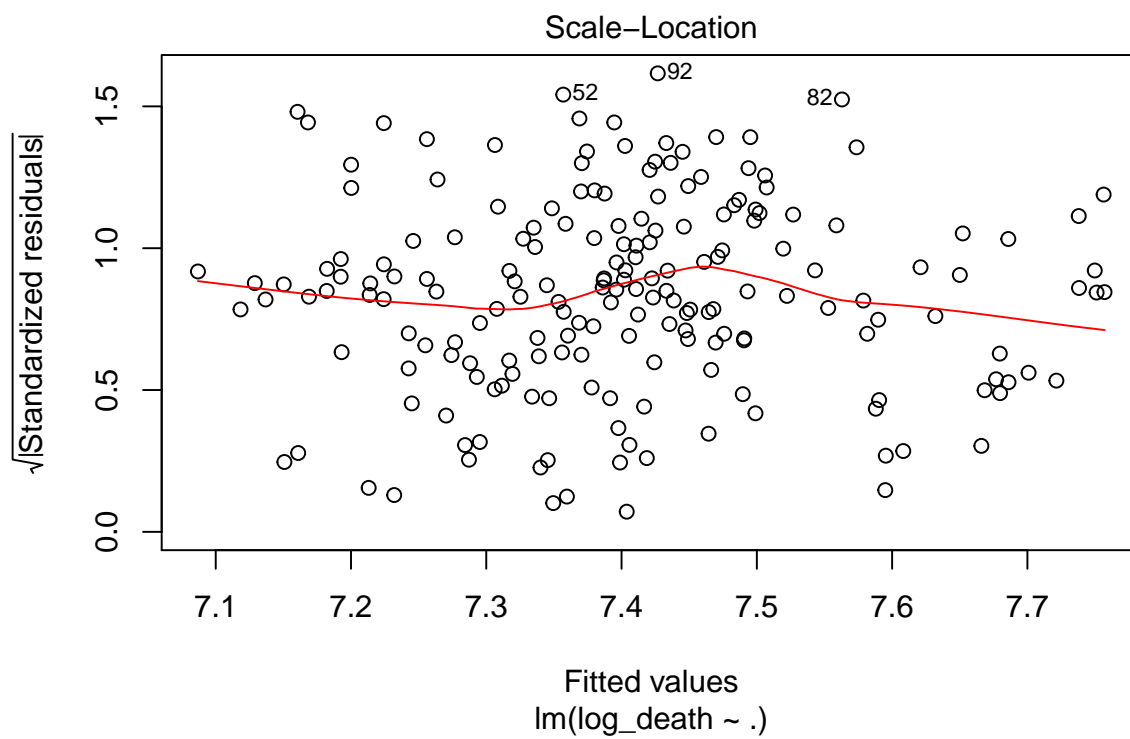
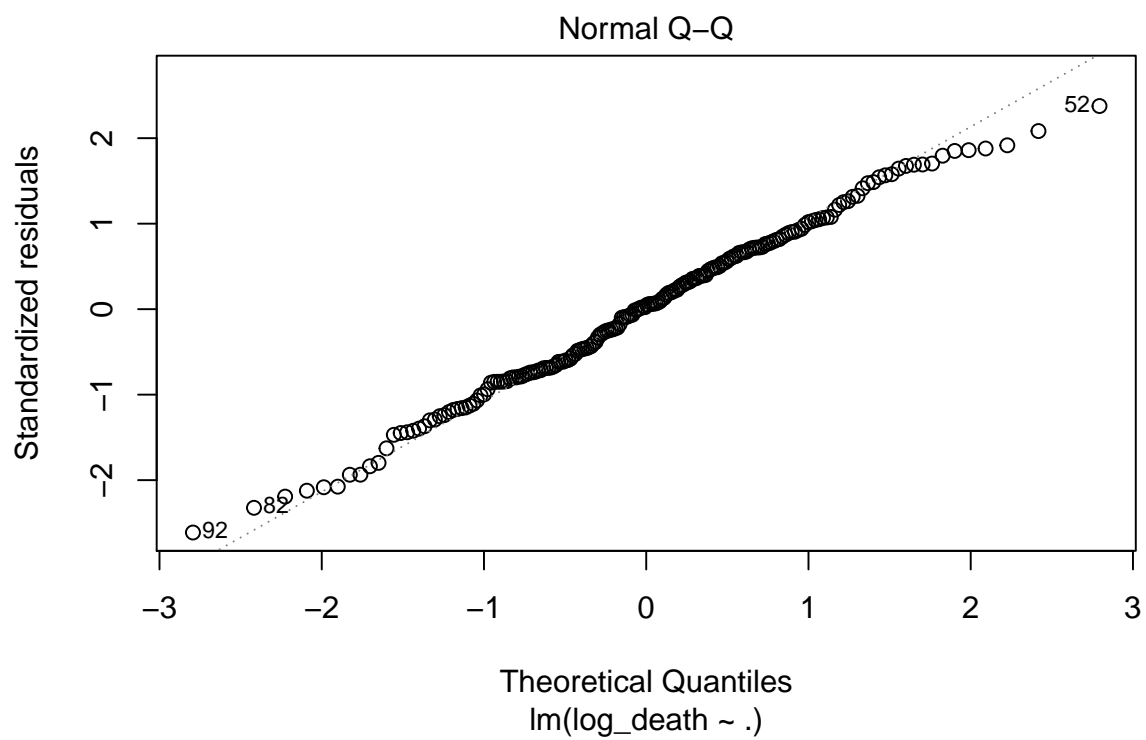
```
##
## Call:
## lm(formula = log_death ~ ., data = df)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.236069 -0.064984  0.003402  0.064214  0.214065
##
```

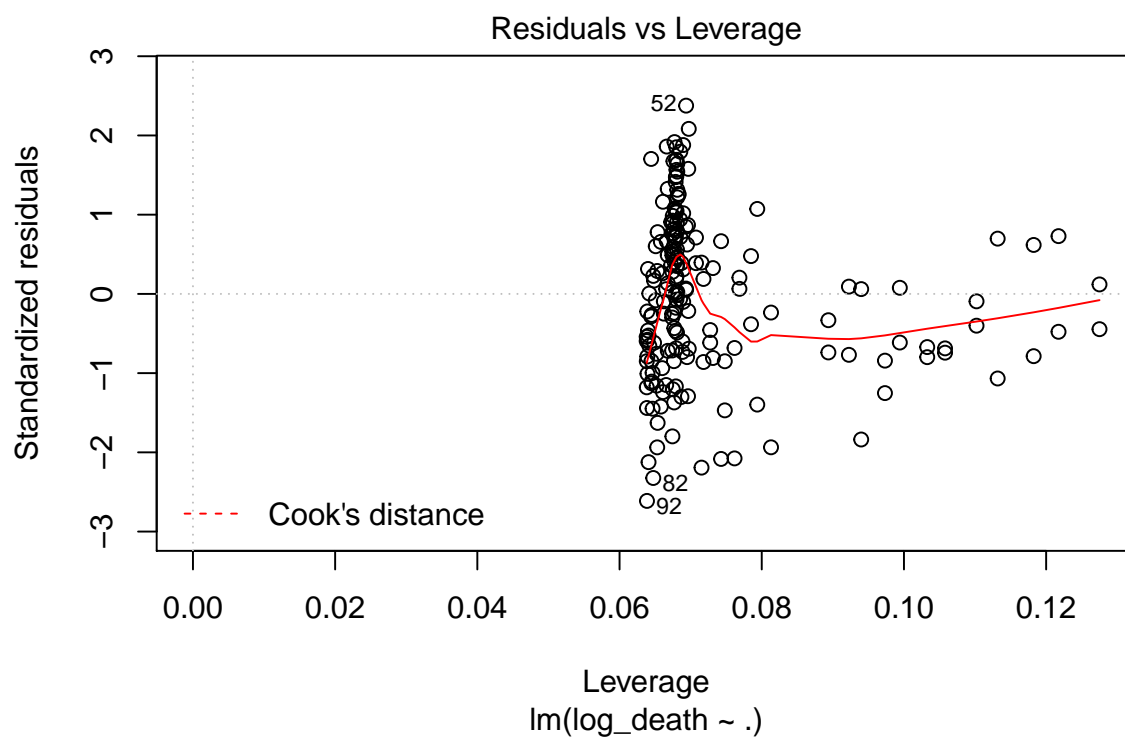


```
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  7.460e+00  2.760e-02 270.258 < 2e-16 ***
## t            2.068e-03  1.236e-03   1.673 0.096058 .
## t.2          -2.903e-05  1.486e-05  -1.954 0.052268 .
## t.3           5.937e-08  5.062e-08   1.173 0.242437
## sin_1        -7.471e-02  9.567e-03  -7.809 4.77e-13 ***
## sin_2        -3.595e-02  9.539e-03  -3.768 0.000223 ***
## sin_3        -1.897e-02  9.534e-03  -1.990 0.048128 *
## sin_4        -1.199e-02  9.532e-03  -1.258 0.210199
## sin_5         1.651e-02  9.531e-03   1.732 0.085045 .
## cos_1         1.147e-01  9.534e-03  12.034 < 2e-16 ***
## cos_2         6.297e-02  9.534e-03   6.606 4.42e-10 ***
## cos_3         3.101e-02  9.534e-03   3.253 0.001367 **
## cos_4         2.309e-02  9.534e-03   2.422 0.016458 *
## cos_5         2.564e-02  9.534e-03   2.689 0.007841 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.09338 on 178 degrees of freedom
## Multiple R-squared:  0.7231, Adjusted R-squared:  0.7029
## F-statistic: 35.76 on 13 and 178 DF, p-value: < 2.2e-16
```

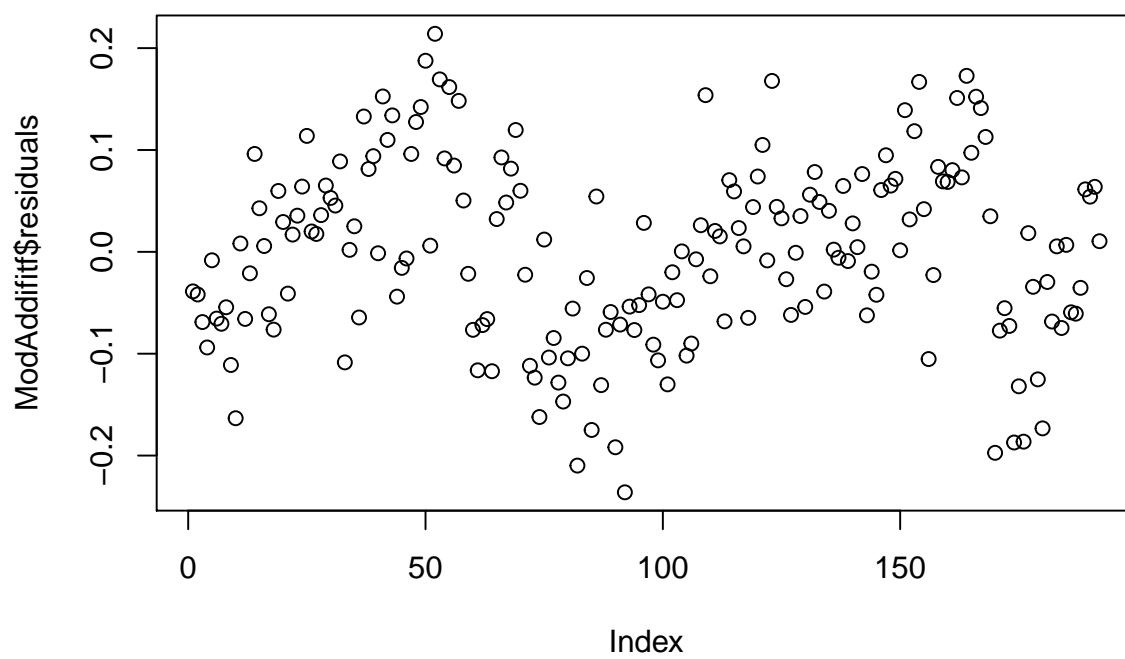
```
plot(ModAddifitf)
```







```
plot(ModAddifitf$residuals)
```



```
t.test(ModAddifitf$residuals)
```

```
##  
## One Sample t-test  
##  
## data: ModAddifitf$residuals  
## t = 5.3199e-16, df = 191, p-value = 1  
## alternative hypothesis: true mean is not equal to 0  
## 95 percent confidence interval:  
## -0.01283293 0.01283293  
## sample estimates:  
## mean of x  
## 3.461175e-18
```

```
acf(ModAddifitf$residuals, 192)
```

