```r
y=c(21.99,21.37,24.72,27.16,30.60,31.52,33.35,38.21,33.55,40.29)
x1=c(10,11,12,13,14,15,16,17,18,19)
x2=c(12,11,12,13,16,15,16,17,18,21)
x3=c(2.1,2.2,2,2.7,3.5,3.1,3.3,3.8,3.4,4.1)


#####################
# Ascendante par "add1" (R2 partiel)
order(c(cor(x1,y),cor(x2,y),cor(x3,y)),decreasing = T)
x1.lm = lm(y~x1)
summary(x1.lm)
# x1 est significative

exd = data.frame(y=y,x1=x1,x2=x2,x3=x3)
add1(x1.lm, ~x1+x2+x3, data = exd, test = "F")
x1x3.lm = lm(y~x1+x3)
add1(x1x3.lm, ~x1+x2+x3, data = exd, test = "F")

# expliquer la sortie de "add1"
x1x2.lm = lm(y~x1+x2)
x1x3.lm = lm(y~x1+x3)


avx1 = anova(x1.lm); scr1 = avx1$Sum[2]
avx1x2 = anova(x1x2.lm); scr12 = avx1x2$Sum[3]
avx1x3 = anova(x1x3.lm); scr13 = avx1x3$Sum[3]

# RSS
scr1; scr12; scr13
# Sum of Sq
scr1-scr12; scr1-scr13
# AIC
extractAIC(x1.lm); extractAIC(x1x2.lm); extractAIC(x1x3.lm)
2*2+10*log(sum((y-x1.lm$fitted.values)^2)/10)
2*3+10*log(sum((y-x1x2.lm$fitted.values)^2)/10)
2*3+10*log(sum((y-x1x3.lm$fitted.values)^2)/10)
# F value
(f12 = ((scr1-scr12)/(3-2))/(scr12/(10-3)))
(f13 = ((scr1-scr13)/(3-2))/(scr13/(10-3)))

1-pf(f12, 1, 7); 1-pf(f13, 1, 7)

# Calcul Rp_x2
library(asbio);
partial.R2(x1.lm, x1x2.lm)

# calcul manuel
# Modele 1 : x1
sce1=avx1$Sum[1]
scr1=avx1$Sum[2]
# Modele 2 : x1+x2
sce2=sum(avx1x2$Sum[1:2])
Rpx2=(sce2-sce1)/scr1
Rpx2

# Calcul Rp_x3
partial.R2(x1.lm, x1x3.lm)

# calcul manuel
# Modele 2 : x1+x3
sce2=sum(avx1x3$Sum[1:2])
Rpx3=(sce2-sce1)/scr1
Rpx3

# On selectionne x3
summary(lm(y~x1+x3))
# x1 et x3 sont tous significatifs


#######################
# Descendante par "drop1"
x1x2x3.lm = lm(y~x1+x2+x3)
```

```
drop1(x1x2x3.lm, test = "F")
drop1(x1x3.lm, test = "F")

avx1x2x3 = anova(x1x2x3.lm); scr123 = avx1x2x3$Sum[4]
x2x3.lm = lm(y~x2+x3)
avx2x3 = anova(x2x3.lm); scr23 = avx2x3$Sum[3]

((scr23-scr123)/(4-3))/(scr123/(10-4))
((scr13-scr123)/(4-3))/(scr123/(10-4))
((scr12-scr123)/(4-3))/(scr123/(10-4))

###########################
# step
step(x1.lm, ~x1+x2+x3, data = exd, direction = "forward", trace = 1, test = "F")
step(x1x2x3.lm, direction = "backward", trace = 1, test = "F")
step(x1.lm, ~x1+x2+x3, data = exd, direction = "both", trace = 1, test = "F")
step(x1x2x3.lm, direction = "both", trace = 1, test = "F")
```