```r
i = 1:100; X1 = i; X2 = i^2; X3 = i^3; X4 = i^4; X5 = sqrt(i); X6 = 1/i; X7 = log(i);
epsilon = 20*rnorm(100,0); Y = 5-0.03*X2+0.0002*X3-3*X7+epsilon;
j = 1:150; YY = 5-0.03*(j^2)+0.0002*(j^3)-3*log(j);
plot(j, YY,"l", xlim = c(-10, 160), ylim = c(-150, 50)); points(i, Y);

y.lm7 = lm(Y~X1+X2+X3+X4+X5+X6+X7);
new = data.frame(X1=j, X2=j^2, X3=j^3, X4=j^4, X5=sqrt(j), X6=1/j, X7=log(j));
y.pred7 = predict(y.lm7, new); points(j, y.pred7, "l", lty="dashed");

step(y.lm7, k = 2);
#y.pred.aic = predict(lm(Y~?+?+?), new);
#points(j, y.pred.aic, pch = 20, col = "red")
######## CHAMPA ############################
champa=read.table(
"C:/Users/Admin/Documents/cours/cours/modele_lineaire_par_exemple/Donnees/champa.txt",header=
TRUE)
lnY=log(champa$Y)
lnX1=log(champa$X1)
lnX2=log(champa$X2)
lnX3=log(champa$X3)

# Descendante
reg2=lm(lnY~lnX1+lnX2+lnX3)
summary(reg2)

step(reg2, direction = "backward", trace = 1)
step(reg2, direction = "both", trace = 1)
step(reg2, direction = "forward", trace = 1)




#av2=anova(reg2)
#av2
#par(mfrow=c(2,2))
#plot(reg2, las=1)

reg1=lm(lnY~lnX1+lnX2)
summary(reg1)
#av1=anova(reg1)
#av1
#par(mfrow=c(2,2))
#plot(reg1, las=1)

# Ascendante
cor(lnX1,lnY)
cor(lnX2,lnY)
cor(lnX3,lnY)

# VÃ©rification par test partiel
summary(lm(lnY~lnX1))
# X1 est significative

# Calcul Rp_X2
# ModÃ¨le 2 : lnX1+lnX2
av2=anova(lm(lnY~lnX1+lnX2))
sce2=sum(av2$Sum[1:2])
# ModÃ¨le 1 : lnX1
avx1=anova(lm(lnY~lnX1))
sce1=avx1$Sum[1]
scr1=avx1$Sum[2]

Rp2=(sce2-sce1)/scr1
Rp2

# Calcul Rp_X3
# ModÃ¨le 2 : lnX1+lnX3
av2=anova(lm(lnY~lnX1+lnX3))
```

```r
sce2=sum(av2$Sum[1:2])
# ModÃ¨le 1 : lnX1
avx1=anova(lm(lnY~lnX1))
sce1=avx1$Sum[1]
scr1=avx1$Sum[2]

Rp3=(sce2-sce1)/scr1
Rp3
# On sÃ©lectionne X2

# VÃ©rification par test partiel
summary(lm(lnY~lnX1+lnX2))
# X2 est significative

# On sÃ©lectionne X3
# VÃ©rification par test partiel
summary(lm(lnY~lnX1+lnX2+lnX3))
# X3 n'est pas significative, on enlÃ¨ve X3

# R2 multiple
sce2=sum(av2$Sum[1:3])
sct2=sum(av2$Sum)

# R2 partielle
sce1=sum(av1$Sum[1:2])
scr1=av1$Sum[3]

R23=(sce2-sce1)/scr1
####


########## exemple de colinéarité
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)
z=c(2.1,2.2,2,2.7,3.5,3.1,3.3,3.8,3.4,4.1)

regxyz=lm(y~x1+x2+z)
summary(regxyz)

#regxy=lm(y~x1+x2)
#summary(regxy)

# Descendante
regxy2=lm(y~x1+z)
summary(regxy2)

# Ascendante
cor(x1,y)
cor(x2,y)
cor(z,y)

summary(lm(y~z))
summary(lm(y~x1))
# x1 est significative

# Calcul Rp_X2
# ModÃ¨le 2 : x1+x2
avx1x2=anova(lm(y~x1+x2))
sce2=sum(avx1x2$Sum[1:2])
avx1z=anova(lm(y~x1+z))
sce2=sum(avx1z$Sum[1:2])
# ModÃ¨le 1 : x1
avx1=anova(lm(y~z))
avx1=anova(lm(y~x1))
sce1=avx1$Sum[1]
scr1=avx1$Sum[2]

Rpx1=(sce2-sce1)/scr1
```

```
Rpx1

# Calcul Rp_z
# ModÃ¨le 2 : x1+z
avx2z=anova(lm(y~x2+z))
avx1z=anova(lm(y~x1+z))
sce2=sum(avx1z$Sum[1:2])
sce2=sum(avx2z$Sum[1:2])



Rpx2=(sce2-sce1)/scr1
Rpx2
Rpz=(sce2-sce1)/scr1
Rpz
# On sÃ©lectionne X2

# VÃ©rification par test partiel
summary(lm(lnY~lnX1+lnX2))
# X2 est significative

# On sÃ©lectionne X3
# VÃ©rification par test partiel
summary(lm(lnY~lnX1+lnX2+lnX3))
# X3 n'est pas significative, on enlÃ¨ve X3
```