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rm(list=ls())
data()

data(cars)
?cars
summary(cars)
str(cars)
plot(cars)

## linear
lm.car<-lm(cars$dist~cars$speed,x=TRUE,y=TRUE)
summary(lm.car)
par(mfrow=c(2,2))
plot(lm.car)
objects(lm.car)
lm.car$df.residual
nrow(lm.car$x)
4/c(lm.car$df.residual,nrow(lm.car$x))
dev.new()
plot(lm.car,which=4)

## adeq.
require(lmtest)
resettest(lm.car,power=2,type="regressor")
resettest(lm.car,power=2:3,type="regressor")
resettest(lm.car,power=2,type="fitted")
resettest(lm.car,power=2:3,type="fitted")
bptest(lm.car)
require(np)
npcmstest(cars$dist~cars$speed,model=lm.car)
dev.new()
plot(cars$speed,cars$dist,xlim=c(0,25))
points(cars$speed,fitted(lm.car),type='l',col='red')

plot(cars,ylim=c(-20,120),xlim=c(0,27))
points(cars$speed,fitted(lm.car),type='l',col='red')
abline(coef(lm.car)[1],coef(lm.car)[2],col='red')
summary(lm.car)

## zero restriction
lm.car0<-lm(cars$dist~cars$speed -1,x=TRUE,y=TRUE)
points(cars$speed,fitted(lm.car0),type='l',col='blue')
summary(lm.car0)
dev.new()
par(mfrow=c(2,2))
plot(lm.car)
resettest(lm.car0,power=2,type="regressor")
bptest(lm.car0)
npcmstest(cars$dist~cars$speed,model=lm.car0)

## polinom
lm.car2<-lm(cars$dist~cars$speed+I(cars$speed^2)-1,x=TRUE,y=TRUE)

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summary(lm.car2)

dev.new()
plot(cars,ylim=c(-20,120),xlim=c(0,27))
points(cars$speed,fitted(lm.car),type='l',col='red')
points(cars$speed,fitted(lm.car0),type='l',col='blue')
points(cars$speed,fitted(lm.car2),lwd=3,type='l',col='green')
dev.new()
par(mfrow=c(2,2))
plot(lm.car2)
resettest(lm.car2,power=2:3,type="regressor")
resettest(lm.car2,power=3,type="regressor")
bptest(lm.car2)
npcmstest(cars$dist~cars$speed,model=lm.car2)

## expon
lm.care<-lm(I(log(1+cars$dist))~cars$speed-1,x=TRUE,y=TRUE)
lm.careu<-lm(I(log(1+cars$dist))~cars$speed,x=TRUE,y=TRUE)
summary(lm.care)
summary(lm.careu)
c(summary(lm.car)$r.squared,summary(lm.car0)$r.squared,summary(lm.car2)$r.squared
,summary(lm.care)$r.squared)
dev.new()
plot(cars,ylim=c(-20,120),xlim=c(0,27))
points(cars$speed,fitted(lm.car),type='l',col='red')
points(cars$speed,fitted(lm.car0),type='l',col='blue')
points(cars$speed,fitted(lm.car2),lwd=3,type='l',col='green')
points(cars$speed,exp(fitted(lm.care))-1,lwd=3,type='l',col='purple')
b<-coef(lm.careu)
points(cars$speed,exp(b[1])*exp(b[2]*cars$speed),lwd=3,type='l',col='purple')
resettest(lm.care,power=2,type="regressor")
bptest(lm.care)

## np
require(np)
bw.car<-npregbw(cars$dist~cars$speed)
summary(bw.car)
np.car<-npreg(bw.car)
summary(np.car)
plot(np.car,ylim=c(0,120),xlim=c(0,27))
points(cars$speed,cars$dist)

bw.car1<-npregbw(cars$dist~cars$speed,regtype='ll')
np.car1<-npreg(bw.car1)
dev.new()
npplot(bw.car1,ylim=c(0,120))
points(cars$speed,cars$dist)

points(cars$speed,fitted(lm.car),type='l',col='red')
points(cars$speed,fitted(lm.car0),type='l',col='blue')
points(cars$speed,fitted(lm.car2),lwd=3,type='l',col='green')
points(cars$speed,exp(fitted(lm.care))-1,lwd=3,type='l',col='purple')

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points(cars$speed, exp(b[1])*exp(b[2]*cars$speed), lwd=3, type='l', col='purple')
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y<-cars$dist
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x<-cars$speed
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bw.car<-npregbw(y~x)
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nd<-data.frame(x=30)
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npf.car<-npreg(bw.car, newdata=nd)
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npf.car$mean
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fitted(npf.car)
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