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# Zur Erinnerung
# (Daten von Mareike Plüschke)
mp = read.table(file.path(pfadu, "mp.txt"))
plot(durv1 ~ peak, data = mp)

# Regressionsmodell
mp.lm = lm(durv1 ~ peak, data = mp)

# Sind die Residuals normalverteilt?
shapiro.test(resid(mp.lm))

# Residuals beobachten - konstante Varianz?
plot(resid(mp.lm))
abline(h=0, lty=2)

# Autocorrelation?
acf(resid(mp.lm))
# Ausreißer (eventuell 51 entfernen)
plot(mp.lm, 4)

# Regressionslinie
plot(durv1 ~ peak, data = mp)
abline(mp.lm)

# Koeffiziente davon
coef(mp.lm)

# Werte vorhersagen
predict(mp.lm)

new = data.frame(peak = 2)
predict(mp.lm, new)

ylim = c(-50, 250)
plot(durv1 ~ peak, ylim = c(-50, 250), xlim=c(0, 2), data = mp)

abline(mp.lm)
points(2, predict(mp.lm, new))
summary(mp.lm)

# Es gab eine signifikante lineare Beziehung zwischen
# durv1 und peak (R^2 = 0.46,  F[1,95] = 80.8, p < 0.001)

# Mehrfache Regression
ydata = read.table(file.path(pfadu, "ydata.txt"))
head(ydata)

pairs(ydata)

regm = lm(F2 ~ DORSX+DORSY+LIPX+LIPY, data = ydata)
coef(regm)
summary(regm)
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# Adjusted R^2
n = nrow(ydata)
1-(1-0.3939) * (  (n-1)/(n-4-1) )

library(MASS)
stepAIC(regm)

summary(regm)
lip.lm = lm(F2 ~ LIPX + LIPY, data = ydata)
summary(lip.lm)

# Regression OK?
shapiro.test(resid(lip.lm))
plot(resid(lip.lm))
abline(h=0, lty=2)
acf(resid(lip.lm))

# Polynomiale Regression
epg = read.table(paste(pfadu, "epg.txt", sep="/"))
plot(F2 ~ COG, data = epg)
regp = lm(F2 ~ COG + I(COG^2), data = epg)
k = coef(regp)

plot(F2 ~ COG, data = epg)
curve(k[1] + k[2]*x + k[3]*x^2, add=T)
summary(regp)
stepAIC(regp)

# Regression OK?
shapiro.test(resid(regp))
plot(resid(regp))
abline(h=0, lty=2)
acf(resid(regp))
```