

```
data(mtcars)
X <- as.matrix(mtcars[, -1])
y <- mtcars$mpg

model_lm <- lm(mpg ~ ., data = mtcars)
summary(model_lm)

library(glmnet)
ridge <- glmnet(X, y, alpha = 0)
lasso <- glmnet(X, y, alpha = 1)
```

Call:  
lm(formula = mpg ~ ., data = mtcars)

Residuals:

Min	1Q	Median	3Q	Max
-3.4506	-1.6044	-0.1196	1.2193	4.6271

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	12.30337	18.71788	0.657	0.5181
cyl	-0.11144	1.04502	-0.107	0.9161
disp	0.01334	0.01786	0.747	0.4635
hp	-0.02148	0.02177	-0.987	0.3350
drat	0.78711	1.63537	0.481	0.6353
wt	-3.71530	1.89441	-1.961	0.0633 .
qsec	0.82104	0.73084	1.123	0.2739
vs	0.31776	2.10451	0.151	0.8814
am	2.52023	2.05665	1.225	0.2340
gear	0.65541	1.49326	0.439	0.6652
carb	-0.19942	0.82875	-0.241	0.8122

---  
Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.65 on 21 degrees of freedom  
Multiple R-squared: 0.869, Adjusted R-squared: 0.8066  
F-statistic: 13.93 on 10 and 21 DF, p-value: 3.793e-07

Ładowanie wymaganego pakietu: Matrix

Loaded glmnet 4.1-8

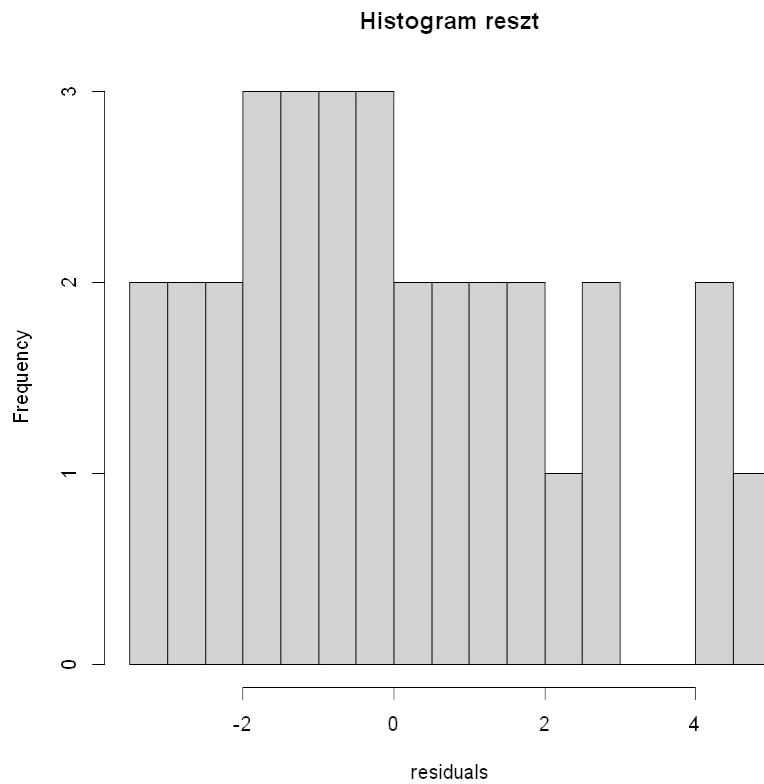
```
# Normalność błędów
model <- lm(mpg ~ ., data = mtcars)
residuals <- residuals(model)

# Histogram reszt
hist(residuals, breaks = 20, main = "Histogram reszt")
```

```
# Test Shapiro-Wilka  
shapiro.test(residuals)
```

Shapiro-Wilk normality test

```
data: residuals  
W = 0.95694, p-value = 0.2261
```



```
# Autokorelacja reszt  
library(lmtest)  
dwtest(model)
```

Ładowanie wymaganego pakietu: zoo

Dołączanie pakietu: 'zoo'

Następujące obiekty zostały zakryte z 'package:base':

```
as.Date, as.Date.numeric
```

### Durbin-Watson test

data: model

DW = 1.8609, p-value = 0.1574

alternative hypothesis: true autocorrelation is greater than 0