tugas_besar_ads

Contents

```r
# Import data
data <- read.csv("Data Cleaned.CSV")
str(data)
```

```
## 'data.frame':    319 obs. of  4 variables:
##  $ NIM          : int  1 2 3 4 5 6 7 8 9 10 ...
##  $ Program_Studi: chr  "Sains Data" "Matematika" "Sains Data" "Sains Data" ...
##  $ IPK          : num  4 3.8 3.4 3.86 3.97 3.35 3.06 2.78 3.18 3.15 ...
##  $ UangSaku     : int  1 1 1 1 2 1 2 2 1 1 ...
```

```r
summary(data)
```

```
##       NIM        Program_Studi           IPK          UangSaku
##  Min.   :  1.0   Length:319         Min.   :1.400   Min.   :1.000
##  1st Qu.:109.0   Class :character   1st Qu.:3.140   1st Qu.:1.000
##  Median :215.0   Mode  :character   Median :3.400   Median :1.000
##  Mean   :217.7                      Mean   :3.383   Mean   :1.476
##  3rd Qu.:328.5                      3rd Qu.:3.670   3rd Qu.:2.000
##  Max.   :450.0                      Max.   :4.000   Max.   :4.000
```

```r
data$IPK <- as.numeric(data$IPK)
data$UangSaku <- as.numeric(data$UangSaku)
```

```r
data$IPK <- as.numeric(data$IPK)

ipk_min   <- min(data$IPK, na.rm = TRUE)
ipk_max   <- max(data$IPK, na.rm = TRUE)
ipk_mean  <- mean(data$IPK, na.rm = TRUE)
ipk_median<- median(data$IPK, na.rm = TRUE)
ipk_sd    <- sd(data$IPK, na.rm = TRUE)

cat("STATISTIK IPK \n")
```

```
## STATISTIK IPK
```

```r
cat("Min IPK        =", ipk_min, "\n")
```

```
## Min IPK        = 1.4
```

```r
cat("Maks IPK       =", ipk_max, "\n")
```

```
## Maks IPK       = 4
```

```r
cat("Rata-rata IPK  =", ipk_mean, "\n")
```

```
## Rata-rata IPK  = 3.382508
```

```r
cat("Median IPK     =", ipk_median, "\n")
```

```
## Median IPK     = 3.4
```

```r
cat("Standar deviasi=", ipk_sd, "\n\n")
```

```
## Standar deviasi= 0.3847126
```

```r
data$UangSaku_f <- factor(
  data$UangSaku,
  levels = c(1, 2, 3, 4),
  labels = c("500k-1jt", "1-1.5jt", "1.5-2jt", ">2jt")
)

cat("FREKUENSI KATEGORI UANG SAKU\n")
```

```
## FREKUENSI KATEGORI UANG SAKU
```

```r
print(table(data$UangSaku_f))
```

```
##
## 500k-1jt  1-1.5jt  1.5-2jt     >2jt
##      214       69       25       11
```

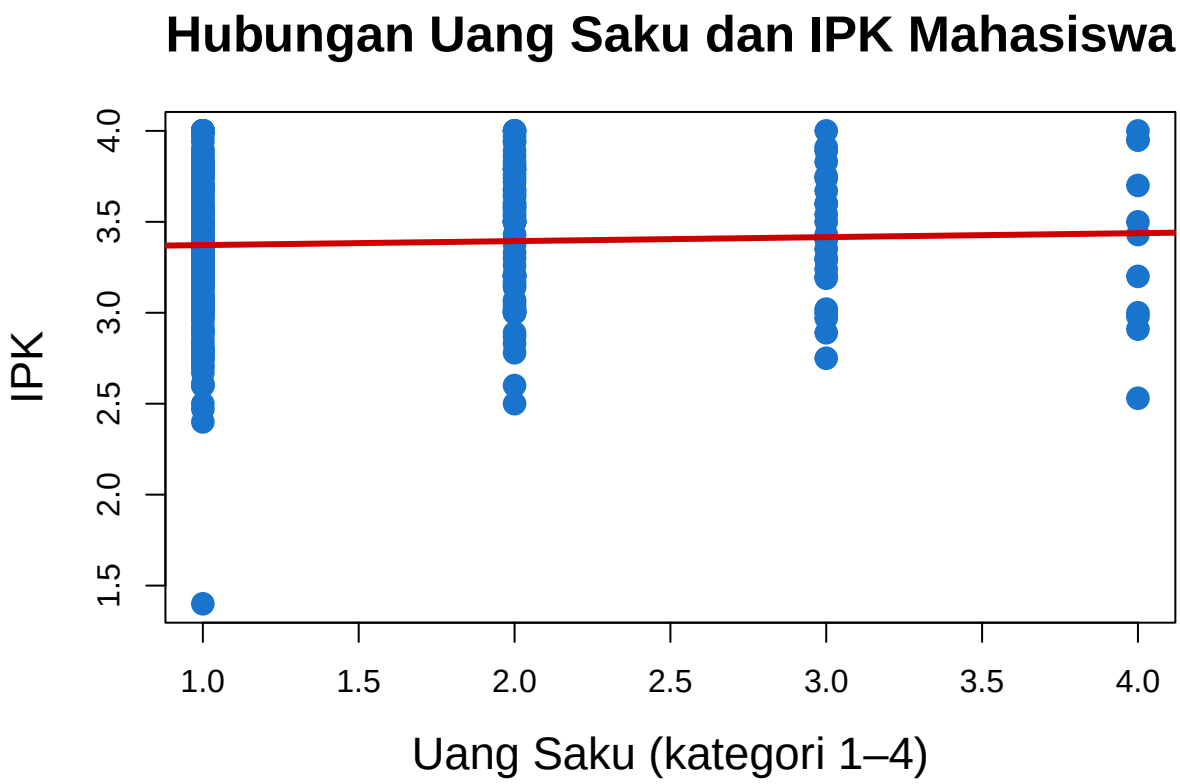
```r
cat("\nPROPORSI KATEGORI UANG SAKU\n")
```

```
##
## PROPORSI KATEGORI UANG SAKU
```

```r
print(prop.table(table(data$UangSaku_f)))
```

```
##
##   500k-1jt    1-1.5jt    1.5-2jt       >2jt
## 0.67084639 0.21630094 0.07836991 0.03448276
```

```r
# Scatter plot
plot(data$UangSaku, data$IPK,
     pch = 19,
     col = "dodgerblue3",
     cex = 1.5,
     xlab = "Uang Saku (kategori 1-4)",
     ylab = "IPK",
     main = "Hubungan Uang Saku dan IPK Mahasiswa",
     cex.lab = 1.4,
     cex.main = 1.6,
     col.lab = "black",
     col.main = "black")

abline(lm(IPK ~ UangSaku, data = data),
       col = "red3",
       lwd = 3)
```




```r
# model regresi
model <- lm(IPK ~ UangSaku, data = data)

summary(model)
```

```
##
## Call:
## lm(formula = IPK ~ UangSaku, data = data)
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.97211 -0.23985  0.02789  0.27198  0.62789
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.35028    0.04600  72.829   <2e-16 ***
## UangSaku     0.02183    0.02753   0.793    0.428
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3849 on 317 degrees of freedom
## Multiple R-squared:  0.00198,    Adjusted R-squared:  -0.001169
## F-statistic: 0.6288 on 1 and 317 DF,  p-value: 0.4284
```

```
confint(model)
```

```
##                   2.5 %     97.5 %
## (Intercept)  3.25977220 3.44078849
## UangSaku    -0.03232858 0.07598281
```

```
# Residual
res <- residuals(model)


b0 <- coef(model)[1]
b1 <- coef(model)[2]

cat("\n=== PERSAMAAN REGRESI LINEAR ===\n")
```

```
##
## === PERSAMAAN REGRESI LINEAR ===
```

```
cat("IPK = ", round(b0, 5), " + ", round(b1, 5), " * UangSaku\n", sep = "")
```

```
## IPK = 3.35028 + 0.02183 * UangSaku
```

```
b0 <- 3.35028
b1 <- 0.02183


cat("=== PERSAMAAN REGRESI LINEAR ===\n")
```

```
## === PERSAMAAN REGRESI LINEAR ===
```

```
cat("IPK = ", b0, " + ", b1, " * UangSaku\n\n", sep="")
```

```
## IPK = 3.35028 + 0.02183 * UangSaku
```

```r
# Interpretasi regresi
cat("=== INTERPRETASI REGRESI ===\n")
```

```
## === INTERPRETASI REGRESI ===
```

```r
cat(
  "1. Intercept (", b0, "):",
  "Nilai ini menunjukkan perkiraan IPK ketika uang saku berada pada kategori 0.",
  "Secara matematis nilai ini diperlukan untuk membentuk persamaan regresi,",
  "namun tidak memiliki makna praktis karena kategori 0 tidak ada dalam data.\n\n",
  sep=" "
)
```

```
## 1. Intercept ( 3.35028 ): Nilai ini menunjukkan perkiraan IPK ketika uang saku berada pada kategori
```

```r
cat(
  "2. Koefisien UangSaku (", b1, "):",
  "Setiap kenaikan satu kategori uang saku akan meningkatkan IPK rata-rata sebesar",
  b1, "poin.",
  "Artinya semakin tinggi kategori uang saku (misal 1 → 2 atau 2 → 3),",
  "maka IPK mahasiswa diprediksi meningkat.\n\n",
  sep=" "
)
```

```
## 2. Koefisien UangSaku ( 0.02183 ): Setiap kenaikan satu kategori uang saku akan meningkatkan IPK rata
```

```r
cat(
  "Kesimpulan: Terdapat pengaruh positif antara uang saku dan IPK,",
  "meskipun besar pengaruhnya kecil sehingga uang saku bukan satu-satunya faktor",
  "yang menentukan IPK mahasiswa.\n",
  sep=" "
)
```

```
## Kesimpulan: Terdapat pengaruh positif antara uang saku dan IPK, meskipun besar pengaruhnya kecil sehi
```

```r
alpha <- 0.05

p_beta1 <- summary(model)$coefficients["UangSaku", "Pr(>|t|)"]

cat("UJI HIPOTESIS KOEFISIEN BETA 1 (PENGARUH UANG SAKU TERHADAP IPK)\n\n")
```

```
## UJI HIPOTESIS KOEFISIEN BETA 1 (PENGARUH UANG SAKU TERHADAP IPK)
```

```r
cat("p-value =", round(p_beta1, 5), "\n")
```

```
## p-value = 0.42838
```

```r
cat("alpha   =", alpha, "\n\n")
```

```
## alpha   = 0.05
```

```r
if (p_beta1 < alpha) {
  cat("Karena p-value <", alpha, ", maka keputusan: Tolak H0.\n")
  cat("Kesimpulan: Uang saku berpengaruh signifikan terhadap IPK mahasiswa.\n")
} else {
  cat("Karena p-value >=", alpha, ", maka keputusan: Gagal menolak H0.\n")
  cat("Kesimpulan: Uang saku tidak berpengaruh signifikan terhadap IPK mahasiswa.\n")
}
```

```
## Karena p-value >= 0.05 , maka keputusan: Gagal menolak H0.
## Kesimpulan: Uang saku tidak berpengaruh signifikan terhadap IPK mahasiswa.
```

```r
# Uji korelasi Pearson
uji_korelasi <- cor.test(data$UangSaku, data$IPK, method = "pearson")

r_value <- uji_korelasi$estimate
p_value <- uji_korelasi$p.value
alpha <- 0.05

cat("UJI KORELASI PEARSON: Uang Saku vs IPK \n\n")
```

```
## UJI KORELASI PEARSON: Uang Saku vs IPK
```

```r
cat("Nilai korelasi (r) =", round(r_value, 5), "\n")
```

```
## Nilai korelasi (r) = 0.04449
```

```r
cat("p-value            =", round(p_value, 5), "\n")
```

```
## p-value            = 0.42838
```

```r
cat("alpha              =", alpha, "\n\n")
```

```
## alpha              = 0.05
```

```r
nilai_kekuatan <- function(r) {
  r_abs <- abs(r)
  if (r_abs < 0.2) return("sangat lemah")
  else if (r_abs < 0.4) return("lemah")
  else if (r_abs < 0.6) return("cukup")
  else if (r_abs < 0.8) return("kuat")
  else return("sangat kuat")
}

kekuatan <- nilai_kekuatan(r_value)
arah <- ifelse(r_value > 0, "positif", "negatif")

cat("Kekuatan korelasi :", kekuatan, "\n")
```

```
## Kekuatan korelasi : sangat lemah
```

```
cat("Arah korelasi     :", arah, "\n\n")
```

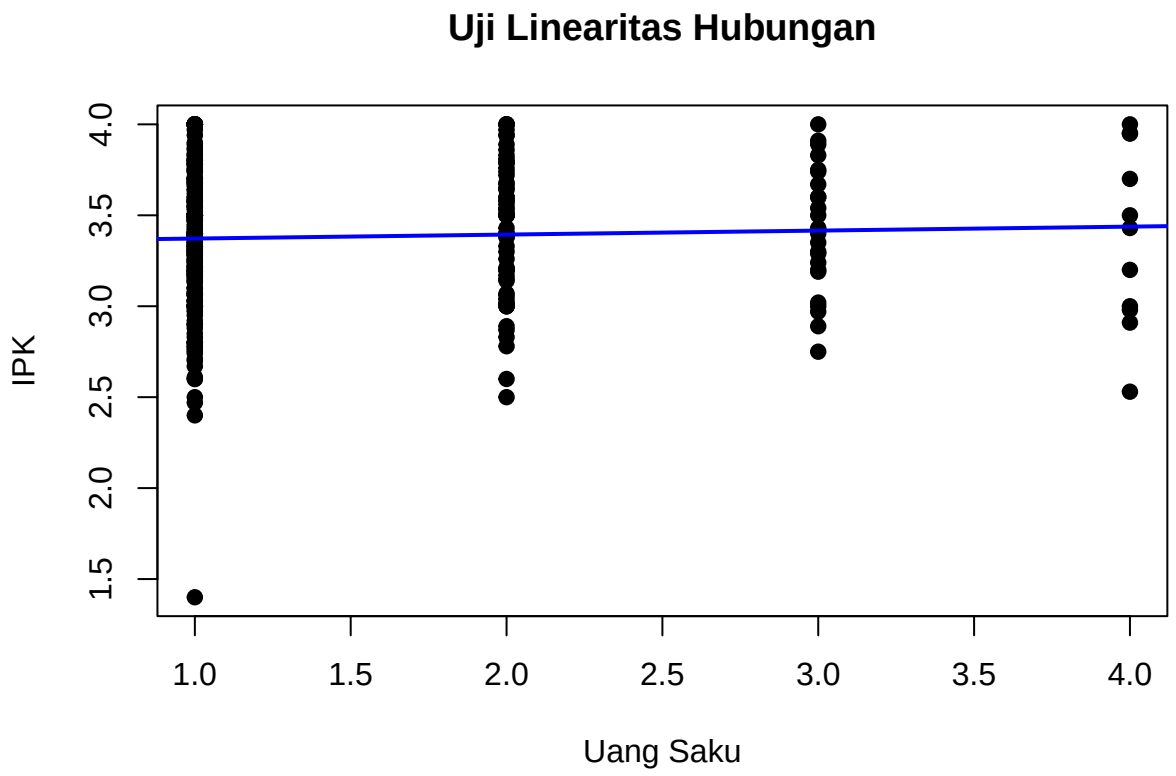
```
## Arah korelasi     : positif
```

```
if (p_value < alpha) {
  cat("Karena p-value <", alpha, ", maka keputusan: Tolak H0.\n")
  cat("Kesimpulan: Terdapat hubungan (korelasi) yang signifikan antara uang saku dan IPK.\n")
} else {
  cat("Karena p-value >=", alpha, ", maka keputusan: Gagal menolak H0.\n")
  cat("Kesimpulan: Tidak terdapat hubungan signifikan antara uang saku dan IPK.\n")
}
```

```
## Karena p-value >= 0.05 , maka keputusan: Gagal menolak H0.
## Kesimpulan: Tidak terdapat hubungan signifikan antara uang saku dan IPK.
```

UJI ASUMSI KLASIK REGRESI LINIER

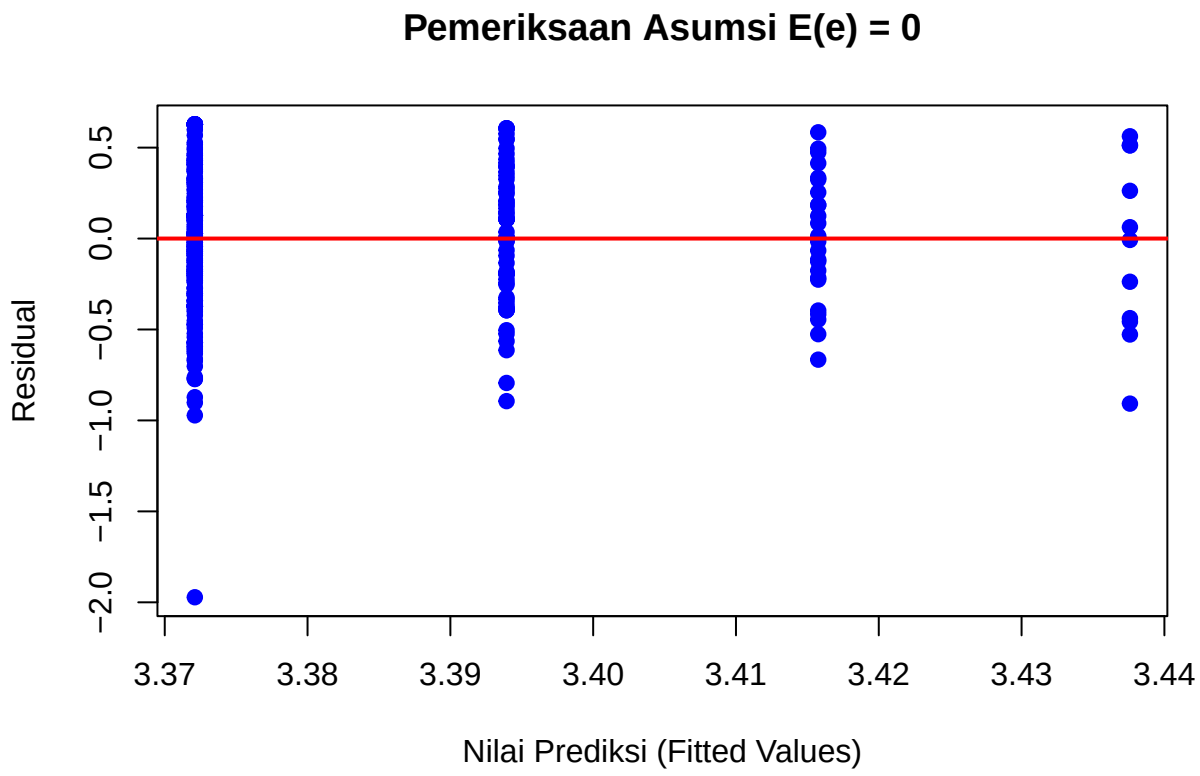
```
# 1. Uji linearitas hubungan
plot(data$UangSaku, data$IPK,
     pch = 19,
     xlab="Uang Saku",
     ylab="IPK",
     main="Uji Linearitas Hubungan")

abline(model, col="blue", lwd=2)
```



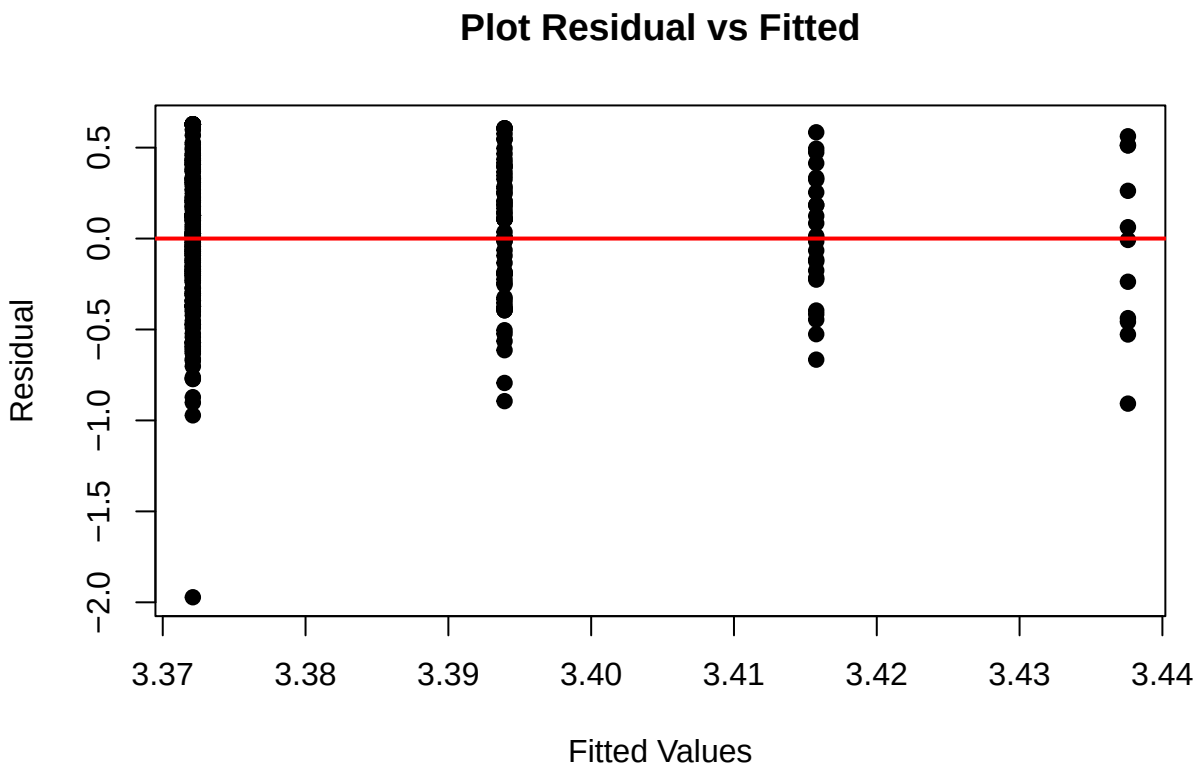

```
# 2. Ekspetasi nilai error = 0
mean_residual <- mean(res)
mean_residual
```

```
## [1] -1.664658e-17
```

```
plot(fitted(model), res,
xlab = "Nilai Prediksi (Fitted Values)",
ylab = "Residual",
main = "Pemeriksaan Asumsi E( ) = 0",
pch = 19, col = "blue")
abline(h = 0, col = "red", lwd = 2)
```




```r
# 3. Homoskedastisitas

plot(model$fitted.values, res,
     pch = 19,
     xlab="Fitted Values",
     ylab="Residual",
     main="Plot Residual vs Fitted")

abline(h=0, col="red", lwd=2)
```




```
library(lmtest)
```

```
## Warning: package 'lmtest' was built under R version 4.5.2
```

```
## Loading required package: zoo
```

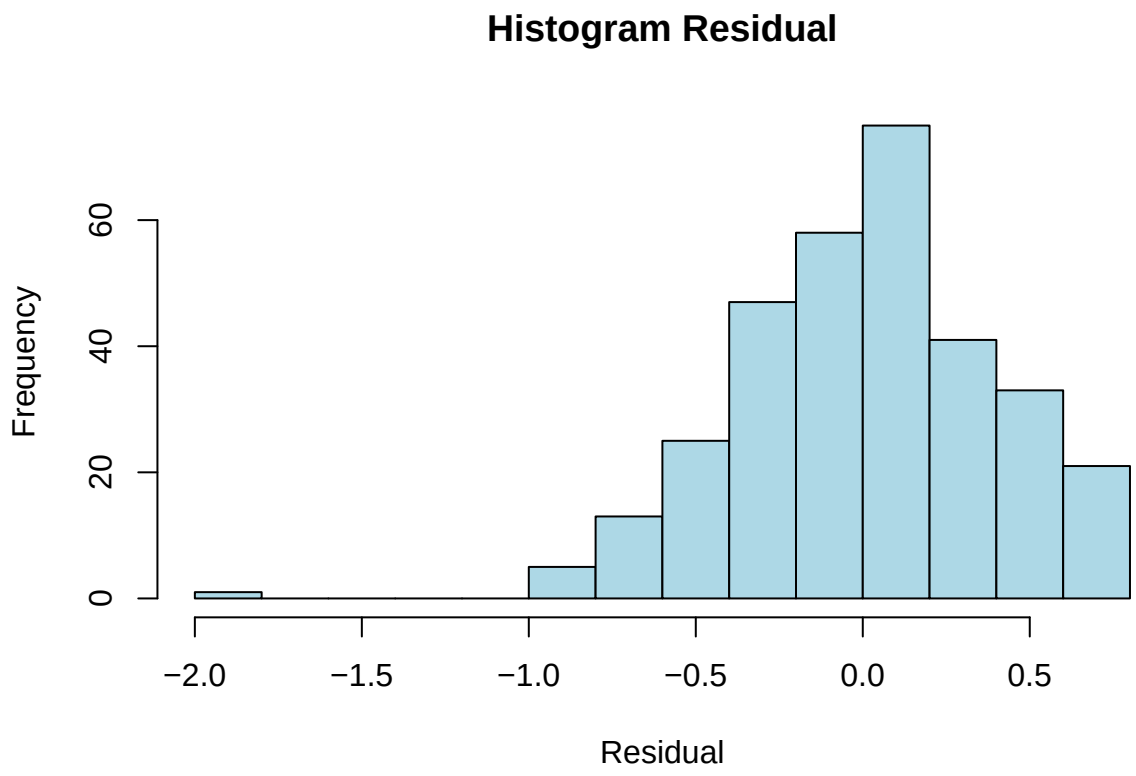
```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

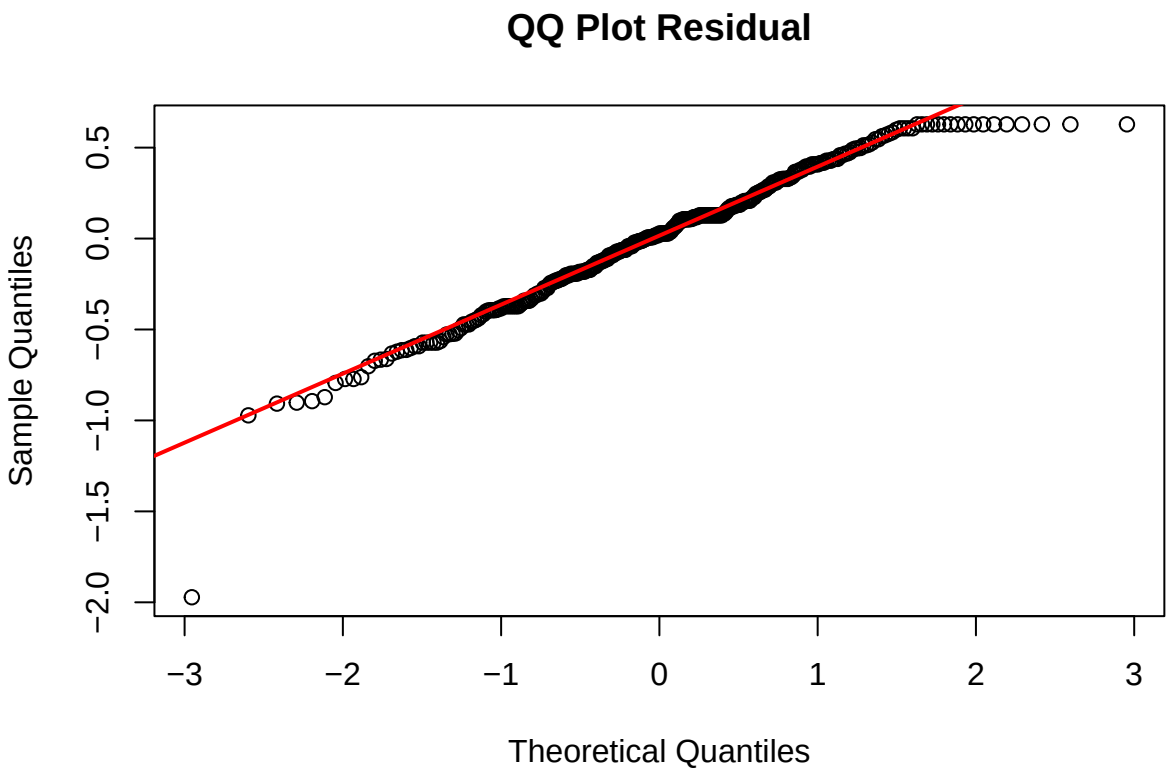
```
bptest(model)
```

```
##
##  studentized Breusch-Pagan test
##
## data:  model
## BP = 0.016046, df = 1, p-value = 0.8992
```

```r
# 4. Distribusi Normal Residual

## a. histogram residual
hist(res,
     breaks = 10,
     main="Histogram Residual",
     xlab="Residual",
     col="lightblue")
```




```r
## b. QQ Plot residual
qqnorm(res,
       main="QQ Plot Residual")
qqline(res, col="red", lwd=2)
```




```
# 5. Uji Normalitas Shapiro-Wilk

shapiro.test(res)
```

```
##
##  Shapiro-Wilk normality test
##
## data:  res
## W = 0.96812, p-value = 1.753e-06
```