ADS CODE

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```r
# 1. Import libraries
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.3.3
```

```r
library(readr)  # Lebih cepat dari read.csv
```

```
## Warning: package 'readr' was built under R version 4.3.2
```

```r
# Baca file CSV
data <- read_csv("C:/project/ads/Tugas Besar ADS_Kelompok 4_RB/data.csv")
```

```
## Rows: 30808 Columns: 5
## — Column specification ————————————————————————————————————————————————
## Delimiter: ","
## chr (1): Tanggal
## dbl (4): Suhu (celcius), Soil (%), GWL (m), Hujan (mm)
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```r
# 2. Menampilkan Summary Deskriptif
str(data)
```

```
## spc_tbl_ [30,808 × 5] (S3: spec_tbl_df/tbl_df/tbl/data.frame)
##  $ Tanggal        : chr [1:30808] "18-04-12 20:10:00" "18-04-12 20:20:00" "18-04-12 20:30:0
0" "18-04-12 20:40:00" ...
##  $ Suhu (celcius): num [1:30808] 27 26.8 26.5 26.3 26.2 26.1 26 26 25.8 25.8 ...
##  $ Soil (%)      : num [1:30808] 9999 9999 9999 9999 9999 ...
##  $ GWL (m)       : num [1:30808] -0.26 -0.26 -0.26 -0.26 -0.26 -0.26 -0.26 -0.26 -0.26 -0.
26 ...
##  $ Hujan (mm)    : num [1:30808] 0 0 0 0 0 0 0 0 0 0 ...
##  - attr(*, "spec")=
##   .. cols(
##   ..   Tanggal = col_character(),
##   ..   `Suhu (celcius)` = col_double(),
##   ..   `Soil (%)` = col_double(),
##   ..   `GWL (m)` = col_double(),
##   ..   `Hujan (mm)` = col_double()
##   .. )
##  - attr(*, "problems")=<externalptr>
```

```
summary(data)
```

```
##     Tanggal          Suhu (celcius)     Soil (%)        GWL (m)
##  Length:30808      Min.   :18.90    Min.   :9999    Min.   :-1.0100
##  Class :character  1st Qu.:24.20    1st Qu.:9999    1st Qu.:-0.8800
##  Mode  :character  Median :26.10    Median :9999    Median :-0.7700
##                    Mean   :28.66    Mean   :9999    Mean   :-0.7235
##                    3rd Qu.:32.80    3rd Qu.:9999    3rd Qu.:-0.5900
##                    Max.   :46.20    Max.   :9999    Max.   :-0.0500
##    Hujan (mm)
##  Min.   : 0.00000
##  1st Qu.: 0.00000
##  Median : 0.00000
##  Mean   : 0.03702
##  3rd Qu.: 0.00000
##  Max.   :14.50000
```

```
# 3. Scatter Plot
plot(
  data$`Suhu (celcius)`, data$`GWL (m)`,
  main = "Scatter Plot Suhu vs GWL",
  xlab = "Suhu (C)", ylab = "GWL (m)",
  pch = 1, col = "blue"
)
```


Scatter Plot Suhu vs GWL
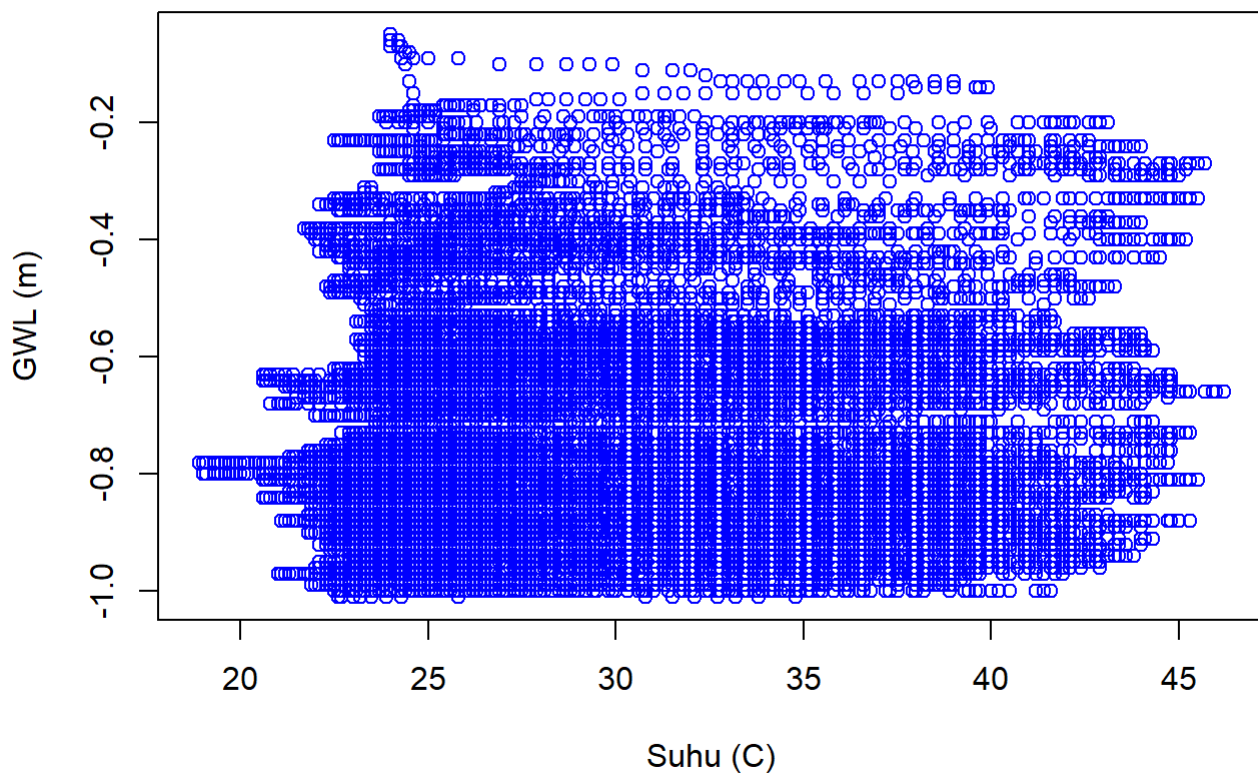
```
# 4. Membuat Model Regresi
model_regresi <-lm(formula = data$"Suhu (celcius)" ~ data$"GWL (m)")
model_regresi
```

```
##
## Call:
## lm(formula = data$"Suhu (celcius)" ~ data$"GWL (m)")
##
## Coefficients:
##    (Intercept)  data$"GWL (m)"
##         29.459          1.111
```
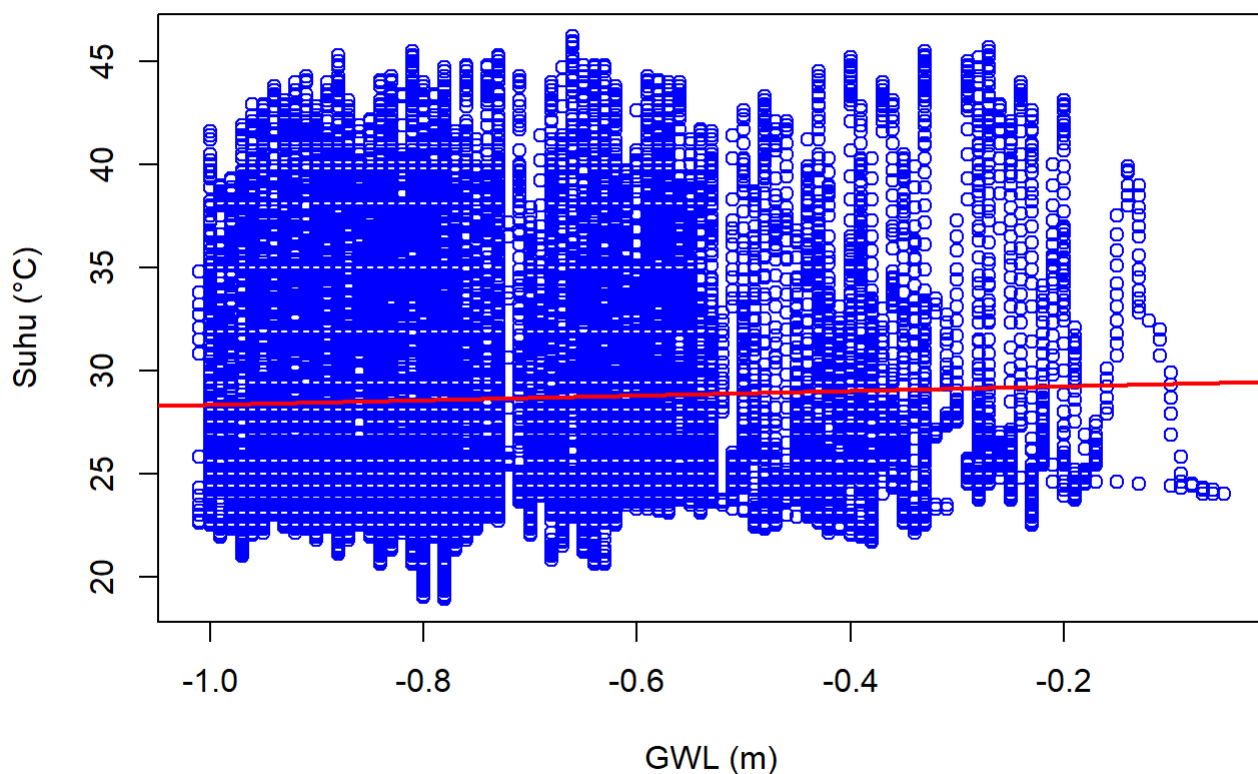
```
# 5. Membuat Garis Regresi
plot(data$`Suhu (celcius)` ~ data$`GWL (m)`,
     col = "blue",
     pch = 1,   # lingkaran bolong
     main = "Scatter Plot: Suhu vs GWL",
     xlab = "GWL (m)",
     ylab = "Suhu (°C)")

# Menambahkan garis regresi
abline(lm(data$`Suhu (celcius)` ~ data$`GWL (m)`), col = "red", lwd = 2)
```


Scatter Plot: Suhu vs GWL

```
# 6. Summary Model Regresi
summary(model_regresi)
```

```
##
## Call:
## lm(formula = data$"Suhu (celcius)" ~ data$"GWL (m)")
##
## Residuals:
##     Min     1Q Median     3Q    Max
## -9.693 -4.526 -2.559  4.152 17.474
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)      29.4592     0.1323 222.749  < 2e-16 ***
## data$"GWL (m)"    1.1109     0.1769   6.278 3.48e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.821 on 30806 degrees of freedom
## Multiple R-squared:  0.001278,   Adjusted R-squared:  0.001245
## F-statistic: 39.41 on 1 and 30806 DF,  p-value: 3.477e-10
```

```
# 7. Korelasi Pearson
# Korelasi antara Suhu dan GWL
cor(x = data$`Suhu (celcius)`, y = data$`GWL (m)`)
```

```
## [1] 0.03574545
```

```
# 8. Koefisien Determinasi Manual
# Membuat model regresi terlebih dahulu
model_regresi <- lm(data$`Suhu (celcius)` ~ data$`GWL (m)`)

# Menampilkan koefisien determinasi dari model
summary(model_regresi)$r.squared
```

```
## [1] 0.001277737
```

```
# 9.Install (jika belum)
install.packages("lmtest", repos = "https://cloud.r-project.org")
```

```
## Installing package into 'C:/Users/Farrel Julio/AppData/Local/R/win-library/4.3'
## (as 'lib' is unspecified)
```

```
## package 'lmtest' successfully unpacked and MD5 sums checked
```

```
## Warning: cannot remove prior installation of package 'lmtest'
```

```
## Warning in file.copy(savedcopy, lib, recursive = TRUE): problem copying
## C:\Users\Farrel
## Julio\AppData\Local\R\win-library\4.3\00LOCK\lmtest\libs\x64\lmtest.dll to
## C:\Users\Farrel
## Julio\AppData\Local\R\win-library\4.3\lmtest\libs\x64\lmtest.dll: Permission
## denied
```

```
## Warning: restored 'lmtest'
```

```
##
## The downloaded binary packages are in
##   C:\Users\Farrel Julio\AppData\Local\Temp\RtmpI1S2BE\downloaded_packages
```

```
# Load package
library(lmtest)
```

```
## Warning: package 'lmtest' was built under R version 4.3.3
```

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

```
## Warning: package 'zoo' was built under R version 4.3.2
```

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

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

```
# Baru jalankan uji Breusch-Pagan
bptest(model_regresi)
```

```
##
##  studentized Breusch-Pagan test
##
## data:  model_regresi
## BP = 4.847, df = 1, p-value = 0.02769
```