Dashboard Development with Shiny and R - R Basics

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Basic Arithmetic

```
1+2
```

```
## [1] 3
```

```
2-3
```

```
## [1] -1
```

```
4*5
```

```
## [1] 20
```

```
6/3
```

```
## [1] 2
```

```
10^10
```

```
## [1] 1e+10
```

```
sqrt(100)
```

```
## [1] 10
```

```
exp(1)
```

```
## [1] 2.718282
```

Object

```
# String
kata <- "Hello World"
kata
```

```
## [1] "Hello World"
```

```
str(kata)
```

```
##  chr "Hello World"
```

```
# number
bilangan = 1.5
bilangan
```

```
## [1] 1.5
```

```
str(bilangan)
```

```
##  num 1.5
```

```r
# Logical
A <- TRUE
isFALSE(A)
```

```
## [1] FALSE
```

```r
B <- F
isFALSE(F)
```

```
## [1] TRUE
```

```r
# array/vector
vektor <- c(1:10)
vektor
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10
```

```r
str(vektor)
```

```
##  int [1:10] 1 2 3 4 5 6 7 8 9 10
```

```r
# matriks
matriks <- matrix(data = 1:9,nrow = 9,ncol = 1)
matriks
```

```
##       [,1]
##  [1,]    1
##  [2,]    2
##  [3,]    3
##  [4,]    4
##  [5,]    5
##  [6,]    6
##  [7,]    7
##  [8,]    8
##  [9,]    9
```

```r
str(matriks)
```

```
##  int [1:9, 1] 1 2 3 4 5 6 7 8 9
```

```r
# list
daftar <- list(daftar1 = c(1,2,3,4),
          daftar2 = "hello",
          daftar3 = "python sucks")
daftar$daftar1
```

```
## [1] 1 2 3 4
```

```r
str(daftar)
```

```
## List of 3
##  $ daftar1: num [1:4] 1 2 3 4
##  $ daftar2: chr "hello"
##  $ daftar3: chr "python sucks"
```

```r
daftar$daftar1
```

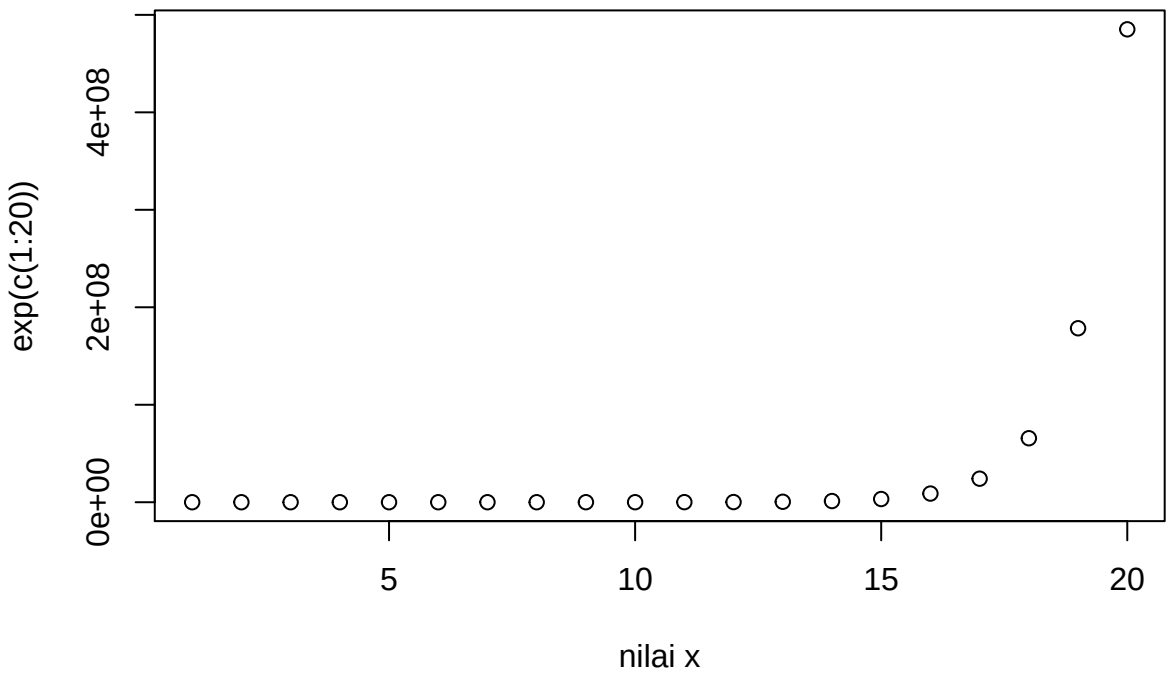
```
## [1] 1 2 3 4
```

```r
# dataframe
kerangkaData <- data.frame(nomor = c(1,2),
```

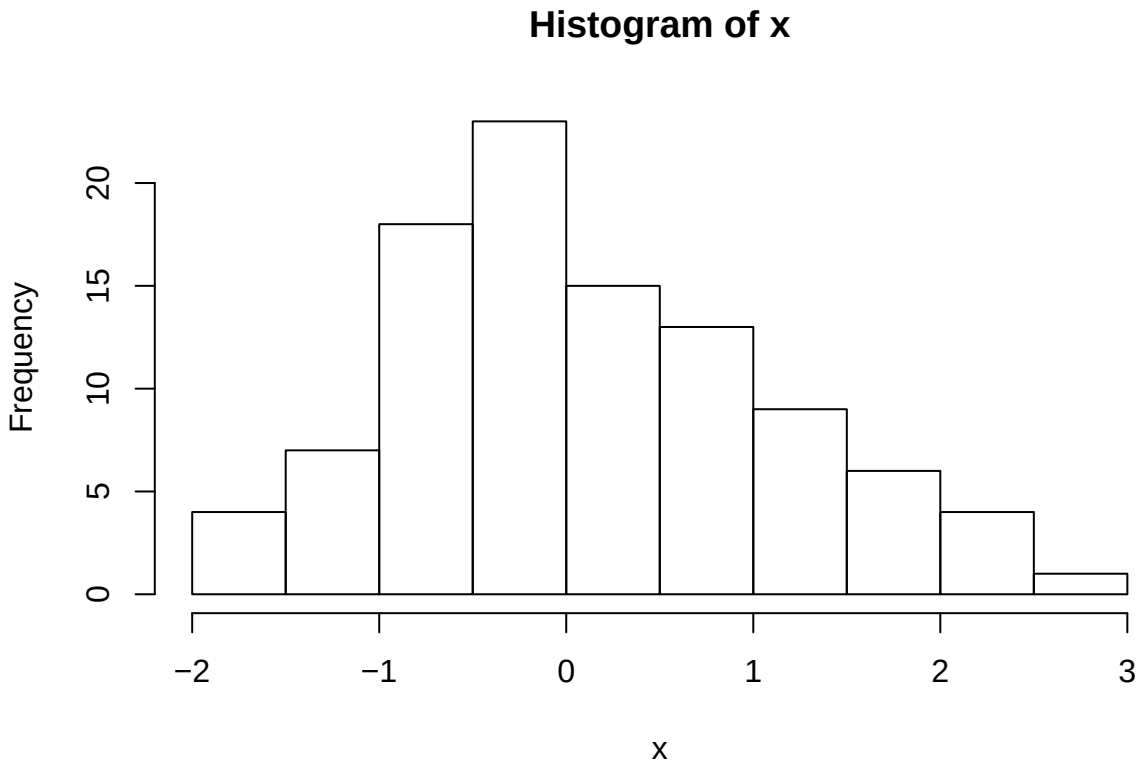
```
                          nama = c("Hadi","Suryo"))
str(kerangkaData)
```

```
## 'data.frame':    2 obs. of  2 variables:
##  $ nomor: num  1 2
##  $ nama : Factor w/ 2 levels "Hadi","Suryo": 1 2
```

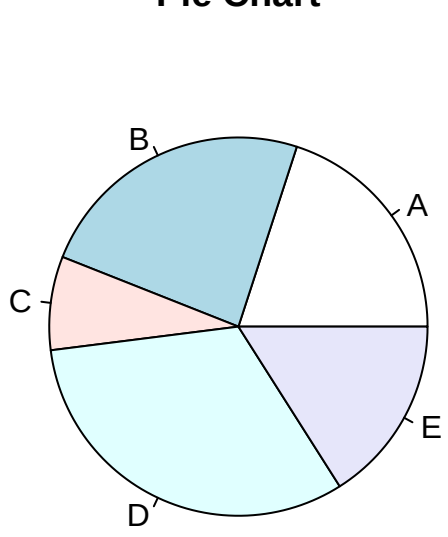
Basic Plotting




```
# Histogram
x <- rnorm(n = 100,mean = 0,sd = 1)
hist(x)
```




```
# Pie Chart
slices <- c(10, 12,4, 16, 8)
lbls <- c("A", "B", "C", "D", "E")
pie(slices, labels = lbls, main="Pie Chart")
```



Looping

```
# For Loop
for (x in c(1:10)) {
  print(x)
```

```
}
```

```
## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
## [1] 6
## [1] 7
## [1] 8
## [1] 9
## [1] 10
```

```
# while loop
x <- 0
while (x < 10) {
  print(x)
  x <- x + 1
}
```

```
## [1] 0
## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
## [1] 6
## [1] 7
## [1] 8
## [1] 9
```

Control Flow

```
# If-Else
x <- 3
if (2 %% x == 0) {
  print("x Genap")
} else {
  print("x Ganjil")
}
```

```
## [1] "x Ganjil"
```

Built-In Function

```
# normal distribution generator
x <- rnorm(100,0,1)
x
```

```
##   [1]  0.68138259 -0.81874383 -0.43222306 -1.31392833 -0.51802487
##   [6]  1.78643276 -0.81246019 -0.35281264 -0.09118446 -0.20852304
##  [11]  1.54213735  0.61651898 -0.12943491  1.45685839 -1.07852045
##  [16]  0.30457155 -0.42492231  1.71448770 -0.30405170 -0.97903574
```

```
##  [21] -0.10490715  0.64914085 -0.39797599  0.51411736  0.45005824
##  [26]  1.11759775  1.91150325 -1.45737507  1.08606864  1.62000451
##  [31] -1.34608999 -0.05922250 -1.30591788 -0.55486715 -1.52554755
##  [36]  1.62417193 -0.73106725  0.28682805 -0.57681654 -3.07355843
##  [41] -0.21241716  0.27259820  1.72944161  0.34017473 -0.37744167
##  [46]  0.09445178  1.14645426 -0.71616403 -1.27937904  0.90917527
##  [51]  2.35316837 -0.62260468  0.48381628  0.81377116  0.98692329
##  [56]  0.89138877  0.58343240 -0.34323790  0.53888608  1.48384201
##  [61] -2.14295535  0.16649507  1.47299058  0.81394350 -0.01322890
##  [66] -0.07985355 -0.38954763  0.82853219 -0.11475273 -1.48978629
##  [71] -0.95908582  0.04489049  0.95706055  0.98668072 -0.30709392
##  [76]  0.69410546  2.62850295 -0.27447098 -0.99577346 -1.47304740
##  [81] -1.39116846  0.71175086  0.13496610  0.52697555 -0.68218536
##  [86] -0.41753579 -0.08050068  0.12964903 -0.07117057 -0.97547823
##  [91] -0.19721914 -1.63872343 -1.17156715  0.57581981  0.32863415
##  [96] -0.52681644  0.06065544 -1.15503285 -0.06469581 -1.54712526
```

```
# Basic Statistical Function
mean(x)
```

```
## [1] 0.007437859
```

```
sd(x)
```

```
## [1] 1.029464
```

```
median(x)
```

```
## [1] -0.07551206
```

```
var(x)
```

```
## [1] 1.059796
```

```
df <- iris
summary(df)
```

```
##   Sepal.Length    Sepal.Width     Petal.Length    Petal.Width
##  Min.   :4.300   Min.   :2.000   Min.   :1.000   Min.   :0.100
##  1st Qu.:5.100   1st Qu.:2.800   1st Qu.:1.600   1st Qu.:0.300
##  Median :5.800   Median :3.000   Median :4.350   Median :1.300
##  Mean   :5.843   Mean   :3.057   Mean   :3.758   Mean   :1.199
##  3rd Qu.:6.400   3rd Qu.:3.300   3rd Qu.:5.100   3rd Qu.:1.800
##  Max.   :7.900   Max.   :4.400   Max.   :6.900   Max.   :2.500
##        Species
##  setosa    :50
##  versicolor:50
##  virginica :50
##
##
##
```

File IO

```
# read CSV file
read.csv("./fasilitas-sekolah-2016-2017.csv", stringsAsFactors = F)
```

```
##                Provinsi    SD  SMP  SMA  SMK
## 1                  Aceh  3422 1074  506  198
## 2         Sumatra Utara  9557 2451 1043  951
## 3         Sumatra Barat  4139  777  312  199
## 4                  Riau  3605 1105  422  273
## 5                 Jambi  2442  643  221  168
## 6      Sumatera Selatan  4646 1277  584  282
## 7              Bengkulu  1364  415  134   90
## 8               Lampung  4641 1314  471  433
## 9  Kep. Bangka Belitung   802  205   66   54
## 10            Kep. Riau   904  331  118   90
## 11          DKI Jakarta  2522 1091  480  585
## 12           Jawa Barat 19793 4878 1520 2705
## 13          Jawa Tengah 19040 3243  856 1547
## 14        DI Yogyakarta  1842  432  161  219
## 15           Jawa Timur 19315 4480 1491 1904
## 16               Banten  4535 1363  511  642
## 17                 Bali  2442  402  160  176
## 18  Nusa Tenggara Barat  3156  857  312  290
## 19  Nusa Tenggara Timur  4998 1581  499  260
## 20     Kalimantan Barat  4349 1250  402  187
## 21     Kalimanta Tengah  2606  796  232  129
## 22   Kalimantan Selatan  2901  588  184  121
## 23     Kalimantan Timur  1838  606  214  214
## 24     Kalimantan Utara   460  161   57   28
## 25       Sulawesi Utara  2219  704  217  178
## 26      Sulawesi Tengah  2869  812  204  173
## 27     Sulawesi Selatan  6384 1617  569  428
## 28    Sulawesi Tenggara  2298  730  284  144
## 29            Gorontalo   931  324   58   55
## 30       Sulawesi Barat  1311  338   81  121
## 31               Maluku  1725  599  263  105
## 32         Maluku Utara  1245  443  179  111
## 33          Papua Barat   966  280  116   51
## 34                Papua  2236  596  217  125
```

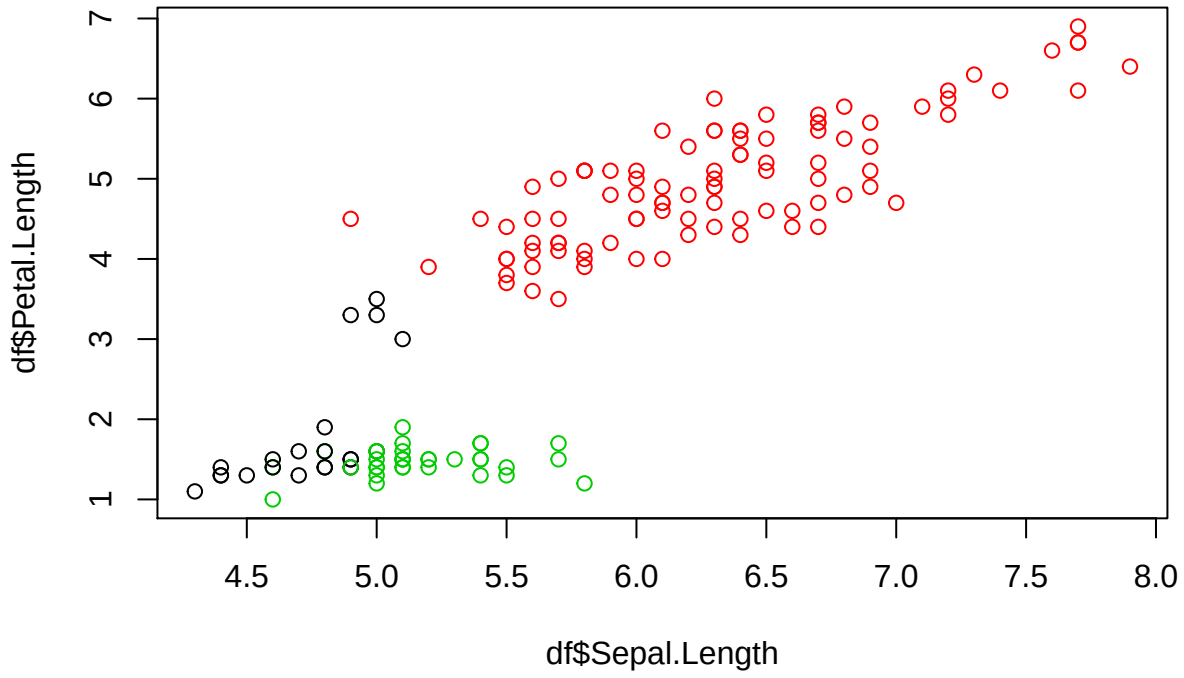
```
library(readxl)
# read xlsx file
readxl::read_xlsx("./angkatan-kerja-per-provinsi.xlsx")
```

```
## # A tibble: 34 x 10
##    daerah    `2010` `2011` `2012` `2013` `2014` `2015` `2016` `2017` `2018`
##    <chr>      <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>
##  1 Aceh     1938519 1.97e6 1.99e6 2.05e6 2.12e6 2.18e6 2.26e6 2.29e6 2.35e6
##  2 Sumater~ 6617377 6.03e6 6.27e6 6.50e6 6.27e6 6.39e6 6.36e6 6.74e6 7.23e6
##  3 Sumater~ 2194040 2.23e6 2.23e6 2.22e6 2.33e6 2.35e6 2.47e6 2.48e6 2.74e6
##  4 Riau     2377494 2.46e6 2.51e6 2.62e6 2.70e6 2.77e6 2.99e6 2.97e6 3.30e6
##  5 Jambi    1545683 1.46e6 1.48e6 1.47e6 1.57e6 1.62e6 1.69e6 1.72e6 1.85e6
##  6 Sumater~ 3665044 3.66e6 3.80e6 3.70e6 3.89e6 3.93e6 4.18e6 4.12e6 4.37e6
##  7 Bengkulu  855026 8.68e5 8.86e5 8.72e5 9.00e5 9.51e5 9.98e5 9.69e5 1.03e6
##  8 Lampung  3957697 3.60e6 3.71e6 3.68e6 3.86e6 3.83e6 4.12e6 4.07e6 4.40e6
##  9 Bangka-~  620063 5.78e5 6.06e5 6.20e5 6.37e5 6.66e5 7.05e5 6.99e5 7.57e5
## 10 Kepulau~  826535 8.07e5 8.44e5 8.54e5 8.78e5 8.92e5 9.31e5 9.66e5 1.07e6
## # ... with 24 more rows
```

```r
# Read from online source and save to disk
df <- read.csv("https://archive.ics.uci.edu/ml/machine-learning-databases/00382/c2k_data_comma.csv")
write.csv(df,file = "data-online.csv")
```

Machine Learning

```r
# K-Means (Unsupervised Learning)
df <- iris
model <- kmeans(df[,-5], centers = 3)
plot(df$Sepal.Length, df$Petal.Length, col = model$cluster)
```




```r
library(shiny)

ui <- fluidPage(
  h1("Hello, World!"),
  sidebarLayout(
    sidebarPanel(
      textInput("textHello","Isi teks","Hello")
    ),
    mainPanel(
      textOutput("textOutput")
    )
  )
)

server <- function(input, output, session) {

  output$textOutput <- reactive({
    input$textHello
  })
```

```
}

shinyApp(ui = ui, server =  server)
```

```
##
## Listening on http://127.0.0.1:5638
```