

# Atv8

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## Atividade 8 - Cálculo Numérico

### Ajuste lineares

```
## Warning: package 'tidyverse' was built under R version 4.1.3

## -- Attaching packages ----- tidyverse 1.3.1 --

## v ggplot2 3.3.5      v purrr 0.3.4
## v tibble 3.1.6       v dplyr 1.0.7
## v tidyr 1.1.4        v stringr 1.4.0
## v readr 2.1.1        v forcats 0.5.1

## Warning: package 'ggplot2' was built under R version 4.1.3

## Warning: package 'tibble' was built under R version 4.1.2

## Warning: package 'tidyr' was built under R version 4.1.2

## Warning: package 'readr' was built under R version 4.1.2

## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()

teste<- tibble(x = c(1,2,3,4), y = c(3,5,6,8))
teste_linear<- mutate(teste, xy = teste$x*teste$y, `x^2` = teste$x*teste$x )
soma_linear<- apply(teste_linear,2,sum)
n <- nrow(teste)

a_linear<- function(soma,n){
  aa<- (n*soma[3] - soma[1]*soma[2])/(n*soma[4] - (soma[1]^2))
  return(aa)
}

a_l<-a_linear(soma_linear,n)

b_linear <- function(soma,n){
  bb<- (soma[1]*soma[3] - soma[2]*soma[4])/((soma[1]^2) - n*soma[4])
```

```

    return(bb)
}

b_l<-b_linear(soma_linear,n)
g_linear<-function(a,b,x){
  g1<- (a*x + b)
  return(g1)
}

```

## Ajuste Logaritmico

$$g(x) = a \cdot \log(x) + b$$

```

teste_log<- mutate(teste, x= log(teste$x), `lnx*y` =(log(teste$x)*teste$y), `lnx^2` <- ((log(teste$x))^2))
soma_log<- apply(teste_log,2, sum)

a_log<-a_linear(soma_log, n)
b_log<- b_linear(soma_log, n)

g_log<- function(a,b,x){
  g2<- (a*log(x) + b)
  return(g2)
}

```

## Ajuste Exponecial

$$g(x) = b e^{ax} \quad y = ax + b$$

```

teste_exp<- mutate(teste, y= log(teste$y), `x*lny` =(log(teste$y)*teste$x), `x^2` = (((teste$x))^2))
soma_exp<- apply(teste_exp,2, sum)
a_exp<- a_linear(soma_exp,n)
b_exp<- exp(b_linear(soma_exp,n))

g_exp<- function(a,b,x){
  g3<- (b*exp(a*x))
  return(g3)
}

```

## Ajuste Potência

$$g_4(x) = b \cdot x^2$$

```

teste_pot<- mutate(teste, x= log(teste$x), y= log(teste$y), `lnx*lny` =(log(teste$x)*log(teste$y)), `lnx`
soma_pot<- apply(teste_pot,2, sum)
a_pot<- a_linear(soma_pot,n)
b_pot <-exp(b_linear(soma_pot,n))

g_pot<- function(a,b,x){

```

```
g4<- (b*(x^(a)))
  return(g4)
}
```

## R<sup>2</sup>

próximo de 0 <- ruim próximo de 1<- bom

```
y_med<- soma_linear[2]/n
gx<- g_linear(a_l,b_l,teste$x)

SQreg<-((abs(gx-y_med))^2)
SQtot<- ((teste$y - y_med)^2)
`R^2`<- (sum(SQreg))/(sum(SQtot))
```

## Lista de Exercícios

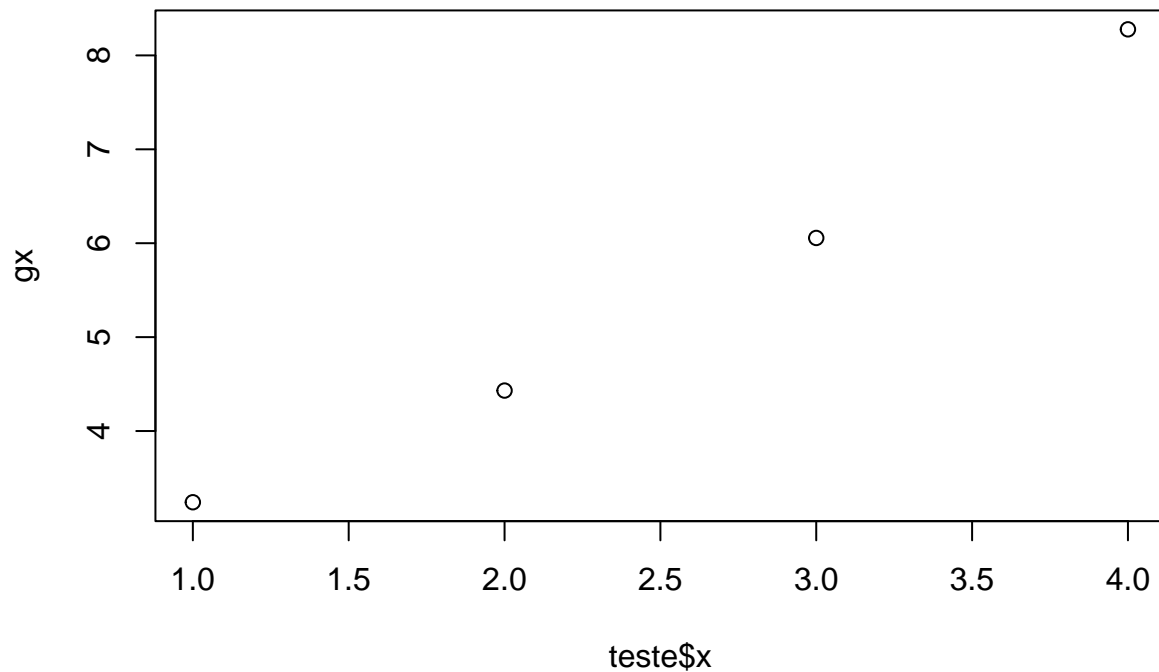
Q1- a) R<sup>2</sup> da exp

```
y_med<- soma_exp[2]/n
gx<- g_exp(a_exp,b_exp,teste$x)

print(gx)
```

```
## [1] 3.241679 4.430765 6.056023 8.277444
```

```
plot(teste$x, gx)
```



```
SQreg<-0
for (i in 1:nrow(teste)) {
  SQreg[i] <- ((gx[i] -y_med))^2
}
SQtot<-0
for (i in 1:nrow(teste)) {
  SQtot[i] <- ((teste$y[i] -y_med))^2
}

print(cbind(SQreg, SQtot))
```

```
##          SQreg      SQtot
## [1,]  2.549982  1.836532
## [2,]  7.761532 11.257281
## [3,] 19.458773 18.967656
## [4,] 43.991794 40.388404
```

```
`R^2`<- (sum(SQreg))/(sum(SQtot))
print(`R^2`)
```

```
## [1] 1.018112
```

O  $R^2$  está maior que 1, logo há algum erro que não consigo identificar.

b)  $R^2$  da log

```
y_med<- soma_log[2]/n
gx<- g_log(a_log,b_log,teste$x)

print(gx)
```

```
## [1] 2.811725 5.157022 6.528933 7.502319
```

```
SQreg<-((abs(gx-y_med))^2)
SQtot<- ((teste$y - y_med)^2)
print(cbind(SQreg, SQtot))
```

```
##           SQreg SQtot
## [1,] 7.2268208 6.25
## [2,] 0.1176337 0.25
## [3,] 1.0587033 0.25
## [4,] 4.0092825 6.25
```

```
`R^2`<- (sum(SQreg))/(sum(SQtot))
print(`R^2`)
```

```
## [1] 0.9548031
```

Q2-

a)

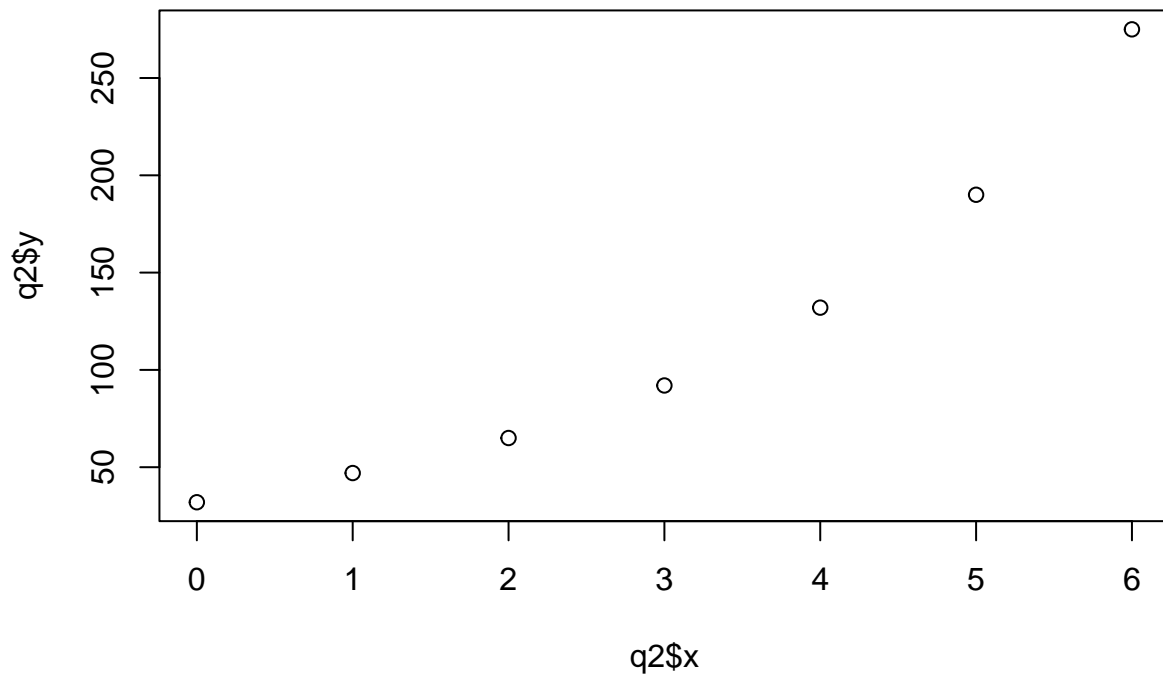
$y = ae^{(bx)}$

```
q2<- tibble(x= c(0,1,2,3,4,5,6), y= c(32,47,65,92,132,190,275))
print(q2)
```

```
## # A tibble: 7 x 2
##       x     y
##   <dbl> <dbl>
## 1     0    32
## 2     1    47
## 3     2    65
## 4     3    92
## 5     4   132
## 6     5   190
## 7     6   275
```

```
n<- nrow(q2)

plot(q2$x,q2$y)
```



```
teste_exp<- mutate(q2, y= log(q2$y), `x*lny` =(log(q2$y)*q2$x), `x^2` = (((q2$x))^2))

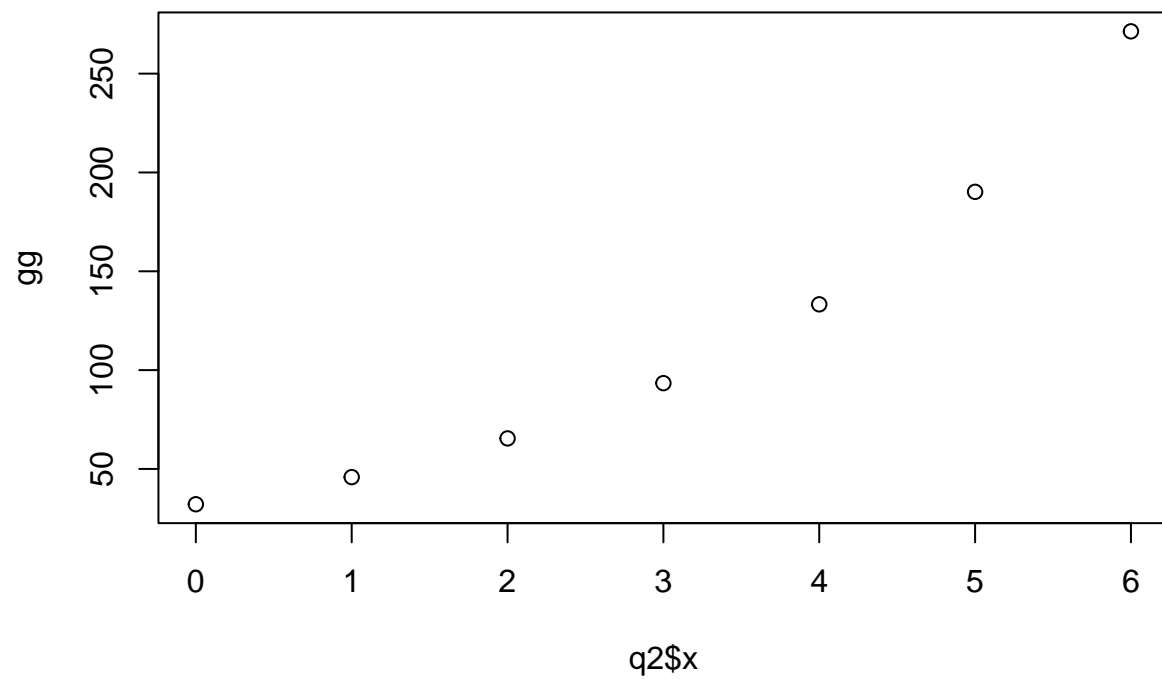
soma_exp<- apply(teste_exp,2, sum)
a_exp<- a_linear(soma_exp,n)
b_exp<- exp(b_linear(soma_exp,n))

print(c(a_exp,b_exp))
```

```
##      x*lny      x
## 0.3555455 32.1468513
```

```
g_exp<- function(a,b,x){
  g3<- (b*exp(a*x))
  return(g3)
}
gg<-g_exp(a_exp,b_exp,q2$x)

plot(q2$x,gg)
```



Q2 - b)

```
hora<- (log(2000/b_exp)/(a_exp))  
print(hora)
```

```
##      x  
## 11.61761
```

```
print(g_exp(a_exp,b_exp,hora))
```

```
##      x  
## 2000
```