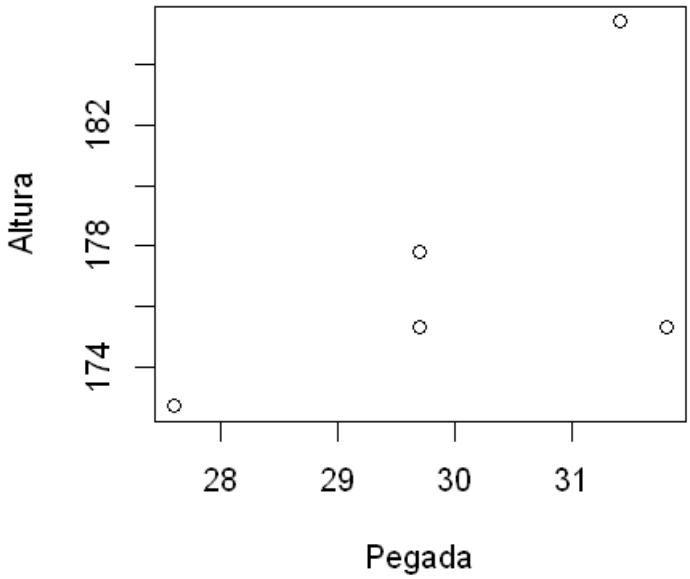
regressao_linear_Semana12

July 20, 2021

[32]:
```
library(tidyverse)
options(repr.plot.width=4, repr.plot.height=4)
```

[33]:
```
Pegada = c(29.7, 29.7, 31.4, 31.8, 27.6)
Altura = c(175.3, 177.8, 185.4, 175.3, 172.7)
```

[36]:
```
plot(Altura ~ Pegada)
```



0.0.1 Passo a passo da regressão linear

[41]:
```
tab = data.frame(Y = Altura, X = Pegada)
mY = mean(tab$Y)
mX = mean(tab$X)
mY
mX
```

177.3

30.04

[46]:
```
tab$dY = tab$Y - mY
tab$dX = tab$X - mX
tab$dX2 = tab$dX^2
tab$dYX = tab$dY * tab$dX
tab
```

Y	X	dY	dX	dX2	dYX
175.3	29.7	-2.0	-0.34	0.1156	0.680
177.8	29.7	0.5	-0.34	0.1156	-0.170
185.4	31.4	8.1	1.36	1.8496	11.016
175.3	31.8	-2.0	1.76	3.0976	-3.520
172.7	27.6	-4.6	-2.44	5.9536	11.224

Estimador de β_1

[49]:
```
SQYX = sum(tab$dYX)
SQYX
SQX
```

19.23

11.132

[50]:
```
b1 = SQYX / SQX
b1
```

1.72745238950773

Estimador de β_0

[51]:
```
b0 = mY - b1 * mX
b0
```

125.407330219188

0.0.2 Estimador de σ^2

[54]:
```
tab$fit = b0 + b1 * tab$X
tab$res = tab$Y - tab$fit
tab$res2 = tab$res^2
tab
```

Y	X	dY	dX	dX2	dYX	fit	res	res2
175.3	29.7	-2.0	-0.34	0.1156	0.680	176.7127	-1.4126662	1.9956258
177.8	29.7	0.5	-0.34	0.1156	-0.170	176.7127	1.0873338	1.1822948
185.4	31.4	8.1	1.36	1.8496	11.016	179.6493	5.7506648	33.0701451
175.3	31.8	-2.0	1.76	3.0976	-3.520	180.3403	-5.0403162	25.4047875
172.7	27.6	-4.6	-2.44	5.9536	11.224	173.0850	-0.3850162	0.1482375

[57]:
```
SQRes = sum(tab$res2)
n = nrow(tab)
s2 = SQRes / (n - 2)
s2
```

20.6003635165888

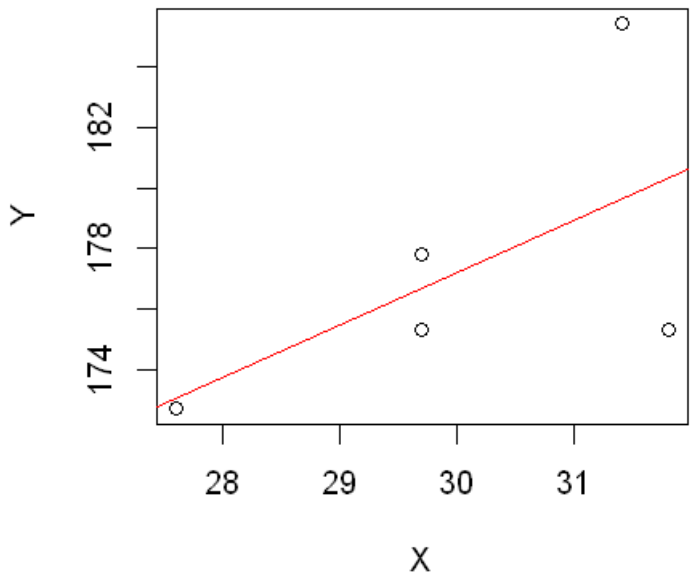
0.0.3 Teste de hipótese sobre β_1

[65]:
```
epb1 = sqrt(s2/SQX)
epb1
tc = b1 / epb1
tc
```

1.36035057083933

1.26985824576226

[61]:
```
plot(Y ~ X, data = tab)
abline(a = b0, b = b1, col = 2)
```



0.0.4 Regressão Linear no R

[62]:
```
mr = lm(Y ~ X, data = tab)
mr
```

```
Call:
lm(formula = Y ~ X, data = tab)

Coefficients:
(Intercept)            X
    125.407        1.727
```

[63]:
```
anova(mr)
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
X	1	33.21891	33.21891	1.61254	0.2936863
Residuals	3	61.80109	20.60036	NA	NA

[64]:
```
summary(mr)
```

```
Call:
```

```
lm(formula = Y ~ X, data = tab)

Residuals:
     1      2      3      4      5
-1.413  1.087  5.751 -5.040 -0.385

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  125.407     40.915   3.065   0.0548 .
X              1.727      1.360   1.270   0.2937
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 4.539 on 3 degrees of freedom
Multiple R-squared:  0.3496,        Adjusted R-squared:  0.1328
F-statistic: 1.613 on 1 and 3 DF,  p-value: 0.2937
```