

```
In [1]: 1 library(tidyverse)
```

Warning message:

"package 'tidyverse' was built under R version 3.6.3"-- Attaching packages -----

----- tidyverse 1.3.0 --

v ggplot2 3.3.3 v purrr 0.3.4

v tibble 3.0.6 v dplyr 1.0.4

v tidyr 1.1.3 v stringr 1.4.0

v readr 1.4.0 v forcats 0.5.1

Warning message:

"package 'ggplot2' was built under R version 3.6.3"Warning message:

"package 'tibble' was built under R version 3.6.3"Warning message:

"package 'tidyr' was built under R version 3.6.3"Warning message:

"package 'readr' was built under R version 3.6.3"Warning message:

"package 'purrr' was built under R version 3.6.3"Warning message:

"package 'dplyr' was built under R version 3.6.3"Warning message:

"package 'stringr' was built under R version 3.6.3"Warning message:

"package 'forcats' was built under R version 3.6.3"-- Conflicts -----

----- tidyverse_conflicts() --

x dplyr::filter() masks stats::filter()

x dplyr::lag() masks stats::lag()

```
In [2]: 1 library('ggplot2')
```

```
In [3]: 1 data(swiss)
```

```
In [4]: 1 str(swiss)
```

'data.frame': 47 obs. of 6 variables:

\$ Fertility : num 80.2 83.1 92.5 85.8 76.9 76.1 83.8 92.4 82.4 82.9 ...

\$ Agriculture : num 17 45.1 39.7 36.5 43.5 35.3 70.2 67.8 53.3 45.2 ...

\$ Examination : int 15 6 5 12 17 9 16 14 12 16 ...

\$ Education : int 12 9 5 7 15 7 7 8 7 13 ...

\$ Catholic : num 9.96 84.84 93.4 33.77 5.16 ...

\$ Infant.Mortality: num 22.2 22.2 20.2 20.3 20.6 26.6 23.6 24.9 21 24.4 ...

In [5]: 1 swiss

	Fertility	Agriculture	Examination	Education	Catholic	Infant.Mortality
Courtelay	80.2	17.0	15	12	9.96	22.2
Delemont	83.1	45.1	6	9	84.84	22.2
Franches-Mnt	92.5	39.7	5	5	93.40	20.2
Moutier	85.8	36.5	12	7	33.77	20.3
Neuveville	76.9	43.5	17	15	5.16	20.6
Porrentruy	76.1	35.3	9	7	90.57	26.6
Broye	83.8	70.2	16	7	92.85	23.6
Glane	92.4	67.8	14	8	97.16	24.9
Gruyere	82.4	53.3	12	7	97.67	21.0
Sarine	82.9	45.2	16	13	91.38	24.4
Veveyse	87.1	64.5	14	6	98.61	24.5
Aigle	64.1	62.0	21	12	8.52	16.5
Aubonne	66.9	67.5	14	7	2.27	19.1
Avenches	68.9	60.7	19	12	4.43	22.7
Cossonay	61.7	69.3	22	5	2.82	18.7
Echallens	68.3	72.6	18	2	24.20	21.2
Grandson	71.7	34.0	17	8	3.30	20.0
Lausanne	55.7	19.4	26	28	12.11	20.2
La Vallee	54.3	15.2	31	20	2.15	10.8
Lavaux	65.1	73.0	19	9	2.84	20.0
Morges	65.5	59.8	22	10	5.23	18.0
Moudon	65.0	55.1	14	3	4.52	22.4
Nyone	56.6	50.9	22	12	15.14	16.7
Orbe	57.4	54.1	20	6	4.20	15.3
Oron	72.5	71.2	12	1	2.40	21.0
Payerne	74.2	58.1	14	8	5.23	23.8
Paysd'enhaut	72.0	63.5	6	3	2.56	18.0
Rolle	60.5	60.8	16	10	7.72	16.3
Vevey	58.3	26.8	25	19	18.46	20.9
Yverdon	65.4	49.5	15	8	6.10	22.5
Conthey	75.5	85.9	3	2	99.71	15.1
Entremont	69.3	84.9	7	6	99.68	19.8
Herens	77.3	89.7	5	2	100.00	18.3
Martigwy	70.5	78.2	12	6	98.96	19.4
Monthey	79.4	64.9	7	3	98.22	20.2
St Maurice	65.0	75.9	9	9	99.06	17.8
Sierre	92.2	84.6	3	3	99.46	16.3

	Fertility	Agriculture	Examination	Education	Catholic	Infant.Mortality
Sion	79.3	63.1	13	13	96.83	18.1
Boudry	70.4	38.4	26	12	5.62	20.3
La Chauxdfnd	65.7	7.7	29	11	13.79	20.5
Le Locle	72.7	16.7	22	13	11.22	18.9
Neuchatel	64.4	17.6	35	32	16.92	23.0
Val de Ruz	77.6	37.6	15	7	4.97	20.0
ValdeTravers	67.6	18.7	25	7	8.65	19.5
V. De Geneve	35.0	1.2	37	53	42.34	18.0
Rive Droite	44.7	46.6	16	29	50.43	18.2
Rive Gauche	42.8	27.7	22	29	58.33	19.3

In [6]: 1 summary(swiss)

```

      Fertility      Agriculture      Examination      Education
Min.   :35.00   Min.   : 1.20   Min.   : 3.00   Min.   : 1.00
1st Qu.:64.70   1st Qu.:35.90   1st Qu.:12.00   1st Qu.: 6.00
Median :70.40   Median :54.10   Median :16.00   Median : 8.00
Mean   :70.14   Mean   :50.66   Mean   :16.49   Mean   :10.98
3rd Qu.:78.45   3rd Qu.:67.65   3rd Qu.:22.00   3rd Qu.:12.00
Max.   :92.50   Max.   :89.70   Max.   :37.00   Max.   :53.00

      Catholic      Infant.Mortality
Min.   : 2.150   Min.   :10.80
1st Qu.: 5.195   1st Qu.:18.15
Median :15.140   Median :20.00
Mean   :41.144   Mean   :19.94
3rd Qu.:93.125   3rd Qu.:21.70
Max.   :100.000   Max.   :26.60

```

```
In [7]: 1 swiss[,1:2]
```

	Fertility	Agriculture
Courtelary	80.2	17.0
Delemont	83.1	45.1
Franches-Mnt	92.5	39.7
Moutier	85.8	36.5
Neuveville	76.9	43.5
Porrentruy	76.1	35.3
Broye	83.8	70.2
Glane	92.4	67.8
Gruyere	82.4	53.3
Sarine	82.9	45.2
Veveyse	87.1	64.5
Aigle	64.1	62.0
Aubonne	66.9	67.5
Avenches	68.9	60.7
Cossonay	61.7	69.3
Echallens	68.3	72.6
Grandson	71.7	34.0
Lausanne	55.7	19.4
La Vallee	54.3	15.2
Lavaux	65.1	73.0
Morges	65.5	59.8
Moudon	65.0	55.1
Nyone	56.6	50.9
Orbe	57.4	54.1
Oron	72.5	71.2
Payerne	74.2	58.1
Paysd'enhaut	72.0	63.5
Rolle	60.5	60.8
Vevey	58.3	26.8
Yverdon	65.4	49.5
Conthey	75.5	85.9
Entremont	69.3	84.9
Herens	77.3	89.7
Martigwy	70.5	78.2
Monthey	79.4	64.9
St Maurice	65.0	75.9
Sierre	92.2	84.6

	Fertility	Agriculture
Sion	79.3	63.1
Boudry	70.4	38.4
La Chauxfnd	65.7	7.7
Le Locle	72.7	16.7
Neuchatel	64.4	17.6
Val de Ruz	77.6	37.6
ValdeTravers	67.6	18.7
V. De Geneve	35.0	1.2
Rive Droite	44.7	46.6
Rive Gauche	42.8	27.7

```
In [14]: 1 f <-swiss$Fertility
          2 f
```

```
80.2  83.1  92.5  85.8  76.9  76.1  83.8  92.4  82.4  82.9  87.1  64.1  66.9  68.9  61.7  68.3
65   56.6  57.4  72.5  74.2  72   60.5  58.3  65.4  75.5  69.3  77.3  70.5  79.4  65   92.2  79.3
67.6  35   44.7  42.8
```

```
In [9]: 1 plot(swiss$Fertility, swiss$Agriculture)
```

```
In [10]: 1 lines(swiss$Fertility, swiss$Agriculture)
```

Error in plot.xy(xy.coords(x, y), type = type, ...): plot.new has not been called yet
Traceback:

```
1. lines(swiss$Fertility, swiss$Agriculture)
2. lines.default(swiss$Fertility, swiss$Agriculture)
3. plot.xy(xy.coords(x, y), type = type, ...)
```

```
In [12]: 1 cor(swiss$Fertility, swiss$Agriculture)
```

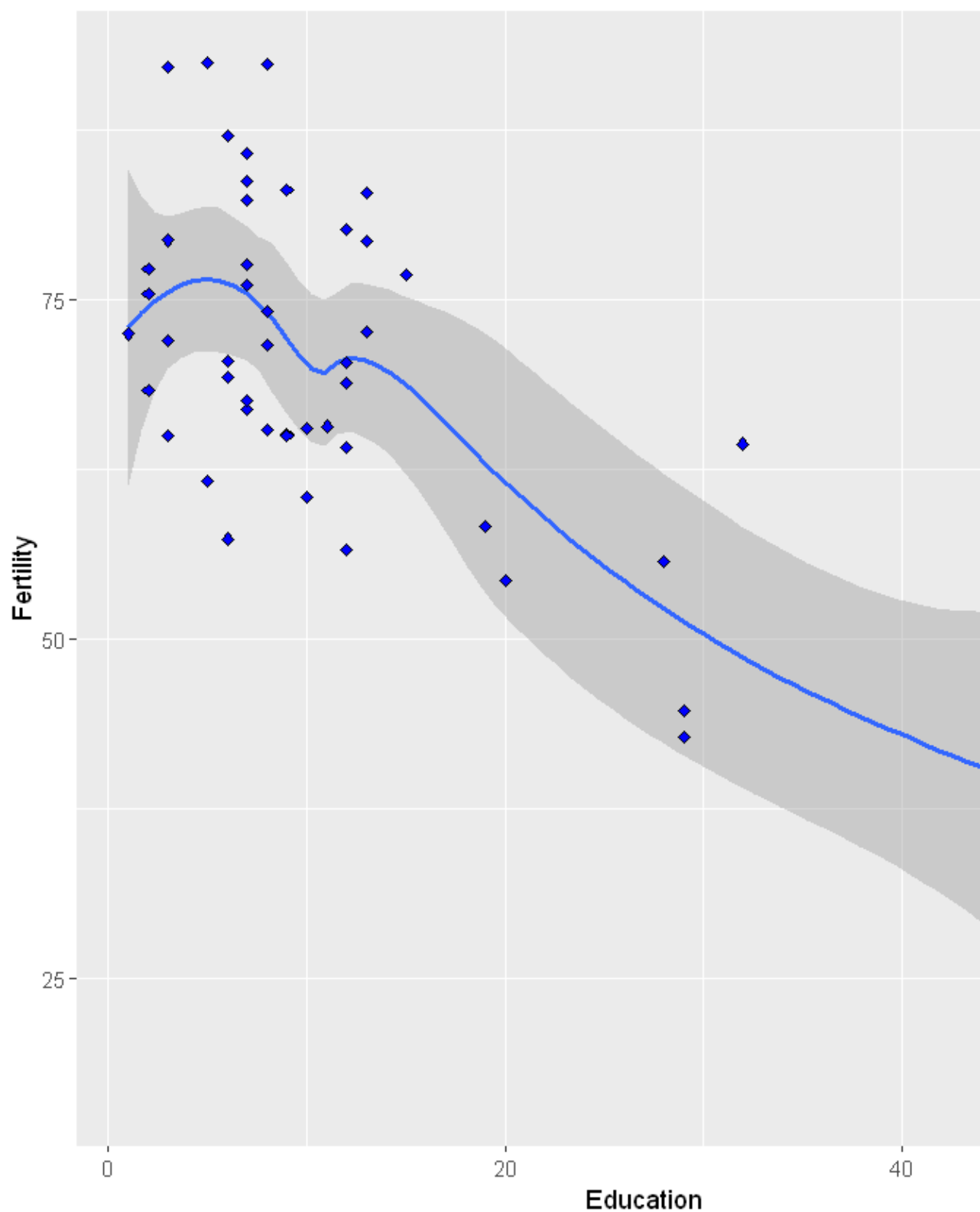
```
0.353079183619975
```

```
In [15]: 1 ggplot(swiss, aes(x = Agriculture , y = Fertility)) + stat_smooth() + geom_p
```

```
`geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

```
In [26]: 1 ggplot(swiss, aes(x = Education , y = Fertility)) + stat_smooth() + geom_poi
```

`geom_smooth()` using method = 'loess' and formula 'y ~ x'



```
In [18]: 1 attach(swiss)
```

The following objects are masked from swiss (pos = 3):

Agriculture, Catholic, Education, Examination, Fertility,
Infant.Mortality

The following objects are masked from swiss (pos = 4):

Agriculture, Catholic, Education, Examination, Fertility,
Infant.Mortality

```
In [22]: 1 cor(Fertility ,swiss)
```

Fertility	Agriculture	Examination	Education	Catholic	Infant.Mortality
1	0.3530792	-0.6458827	-0.6637889	0.4636847	0.416556

```
In [23]: 1 model = lm(Fertility~Agriculture, data = swiss)
2 model
```

Call:

lm(formula = Fertility ~ Agriculture, data = swiss)

Coefficients:

(Intercept) Agriculture
60.3044 0.1942


```
In [24]: 1 summary(model)
```

```
Call:
lm(formula = Fertility ~ Agriculture, data = swiss)

Residuals:
    Min       1Q   Median       3Q      Max
-25.5374  -7.8685  -0.6362   9.0464  24.4858

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  60.30438    4.25126   14.185  <2e-16 ***
Agriculture   0.19420    0.07671    2.532   0.0149 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 11.82 on 45 degrees of freedom
Multiple R-squared:  0.1247,    Adjusted R-squared:  0.1052
F-statistic: 6.409 on 1 and 45 DF,  p-value: 0.01492
```

```
In [27]: 1 model1 = lm(Fertility~Education, data = swiss)
        2 model1
```

```
Call:
lm(formula = Fertility ~ Education, data = swiss)

Coefficients:
(Intercept)  Education
   79.6101    -0.8624
```

```
In [28]: 1 summary(model1)
```

Call:

```
lm(formula = Fertility ~ Education, data = swiss)
```

Residuals:

Min	1Q	Median	3Q	Max
-17.036	-6.711	-1.011	9.526	19.689

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	79.6101	2.1041	37.836	< 2e-16 ***
Education	-0.8624	0.1448	-5.954	3.66e-07 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 9.446 on 45 degrees of freedom

Multiple R-squared: 0.4406, Adjusted R-squared: 0.4282

F-statistic: 35.45 on 1 and 45 DF, p-value: 3.659e-07

```
In [ ]: 1
```