8

```
rm(list=ls()); gc();  gc(); #<1>
if (!require("pacman")) install.packages("pacman") #<2>
pacman::p_load(tidyverse, magrittr,estimatr,car,modelsummary,ggrepel,patchwork) #<3>
```

① r
② pacman
③

```
ice4_1 <- read_csv("data/ice4_1.csv")
ice4_1
```

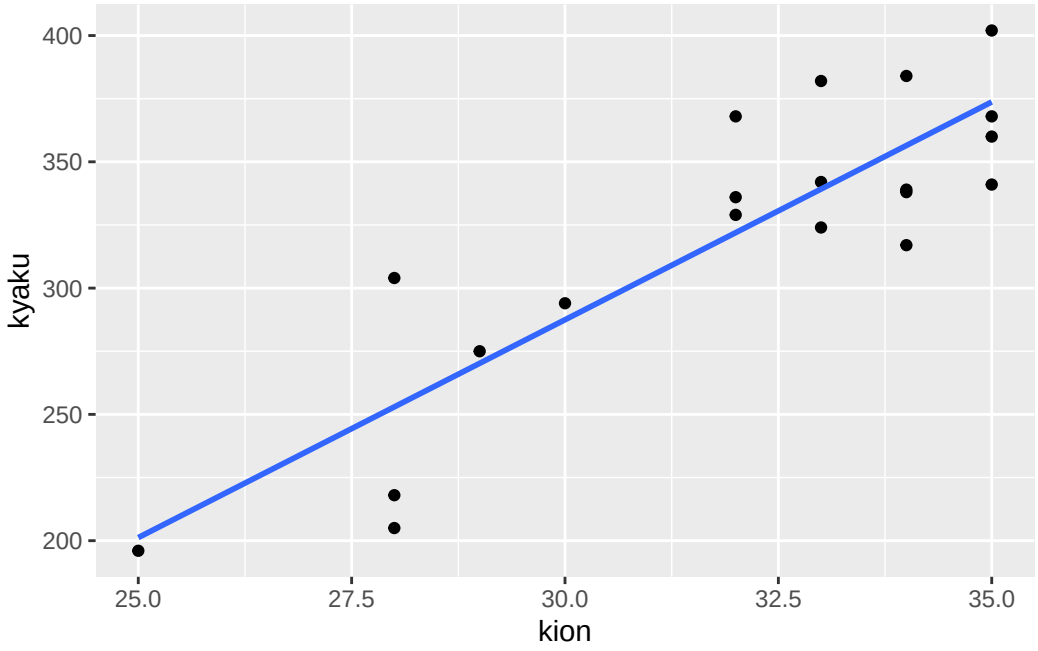
```
# A tibble: 20 x 3
     num  kion kyaku
   <dbl> <dbl> <dbl>
 1     1    33   382
 2     2    33   324
 3     3    34   338
 4     4    34   317
 5     5    35   341
 6     6    35   360
 7     7    34   339
 8     8    32   329
 9     9    28   218
10    10    35   402
11    11    33   342
12    12    28   205
13    13    32   368
14    14    25   196
15    15    28   304
16    16    30   294
17    17    29   275
18    18    32   336
19    19    34   384
20    20    35   368
```

kion kyaku

```
g <- ggplot(data = ice4_1, #<1>
            aes(x = kion, y = kyaku) #<2>
            ) %>%
  + geom_point() %>% #<3>
  + geom_smooth(method = "lm",se=FALSE) #<4>

plot(g)
```

①
② x y
③
④ (lm)

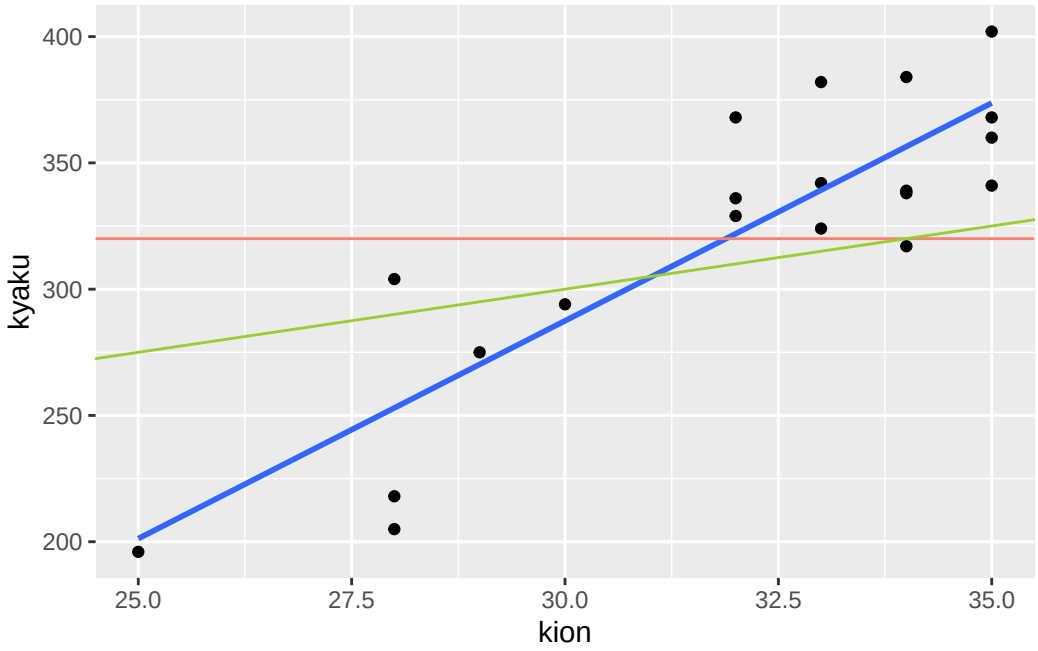



```
g <- ggplot(data = ice4_1, #
            aes(x = kion, y = kyaku) #x y
            ) %>%
  + geom_point() %>% #
  + geom_smooth(method = "lm",se=FALSE) %>%
  + geom_hline(aes(yintercept=320),color = "salmon") %>% #<1>
  + geom_abline(intercept = 150, slope = 5,color = "yellowgreen")#<2>

#             (lm)
```

```
plot(g)
```

① 320
② 5 150



lm() () (~ , data =) summary( ) modelsummary msum

```
kekka4_1 <- lm(kyaku ~ kion, data = ice4_1)
summary(kekka4_1)
```

```
Call:
lm(formula = kyaku ~ kion, data = ice4_1)

Residuals:
    Min      1Q  Median      3Q     Max
-47.969 -17.709  -1.218  17.413  51.031

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  -229.98      73.79  -3.117  0.00596 **
```

Table 0.1

	(1)
(Intercept)	−229.982**
	(73.787)
kion	17.248***
	(2.300)
Num.Obs.	20
R2	0.758
R2 Adj.	0.744
F	56.231
RMSE	28.03

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

```
kion           17.25       2.30   7.499 6.08e-07 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 29.54 on 18 degrees of freedom
Multiple R-squared:  0.7575,    Adjusted R-squared:  0.744
F-statistic: 56.23 on 1 and 18 DF,  p-value: 6.082e-07
```

```
msummary(kekka4_1,
         gof_omit = "Log.Lik.|AIC|BIC",
         title = "",          #
         stars = TRUE)
```

```
ice4_9 <- read_csv("data/ice1_9.csv")
```

```
lm(gpa ~ exam, data = ice4_9) -> kekka
```

```
msummary(kekka,
```

Table 0.2

	(1)
(Intercept)	−1.797+
	(0.896)
exam	0.008***
	(0.002)
Num.Obs.	19
R2	0.580
R2 Adj.	0.556
F	23.509
RMSE	0.48

+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

```
          gof_omit = "Log.Lik.|AIC|BIC",
          title = "",           #
          stars = TRUE)
```

```
#
newdata <- tibble(exam = c(400,500,600,700))
predict(kekka,new = newdata)
```

```
       1        2        3        4
1.429565 2.236329 3.043092 3.849855
```