R2

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7.2.1

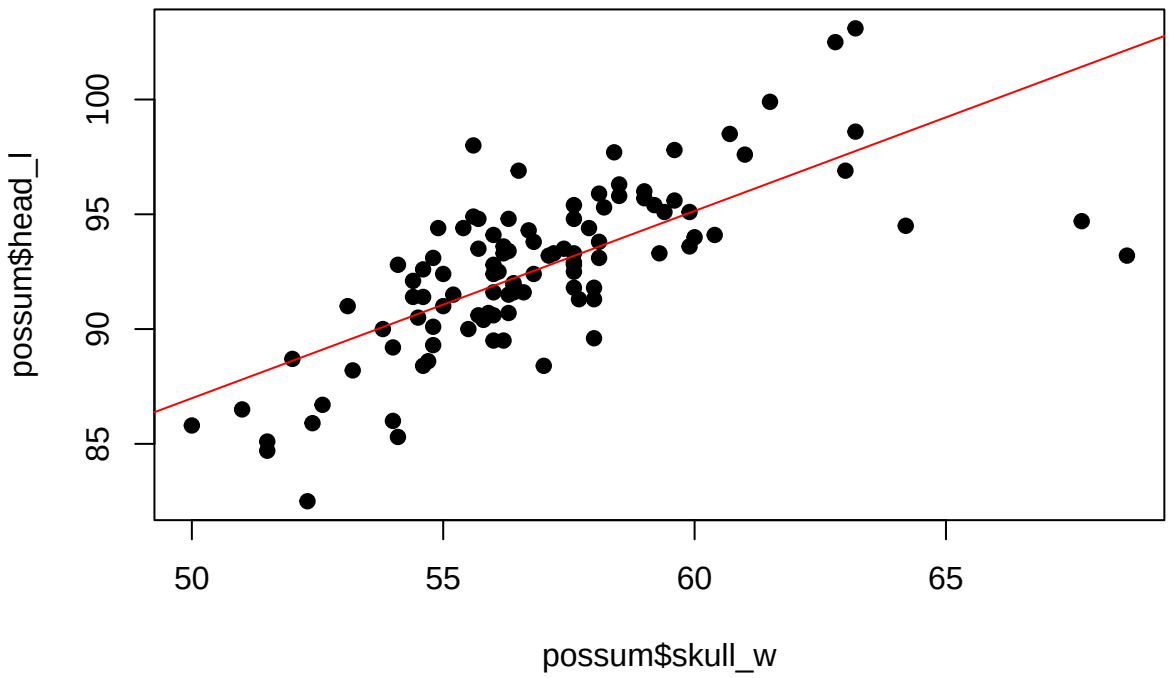
```
possum = read.csv("https://github.com/TienChih/tbil-stats/raw/main/data/possum.csv")
possummod=lm(head_l~skull_w, data=possum)
print(possummod)
```

```
##
## Call:
## lm(formula = head_l ~ skull_w, data = possum)
##
## Coefficients:
## (Intercept)      skull_w
##     46.1954       0.8158
```

```
print(cor(possum$skull_w, possum$head_l))
```

```
## [1] 0.7108268
```

```
plot(possum$skull_w, possum$head_l,  pch=19)
abline(possummod, col="red")
```



a. Moderate b. 71% c. 89.3441 d. 96.78 e. 56.15 f. mm/cm g. 0.8158

7.2.2

a.
b. R2 = 0.5448, R = -0.7381, there is a weak negative relationship
c. 54%
d. The regression line measures age/price of the cars
e. The slope represents how much more or less the car would cost as the car ages
f. $5149
g. 6.34 years old

7.2.3

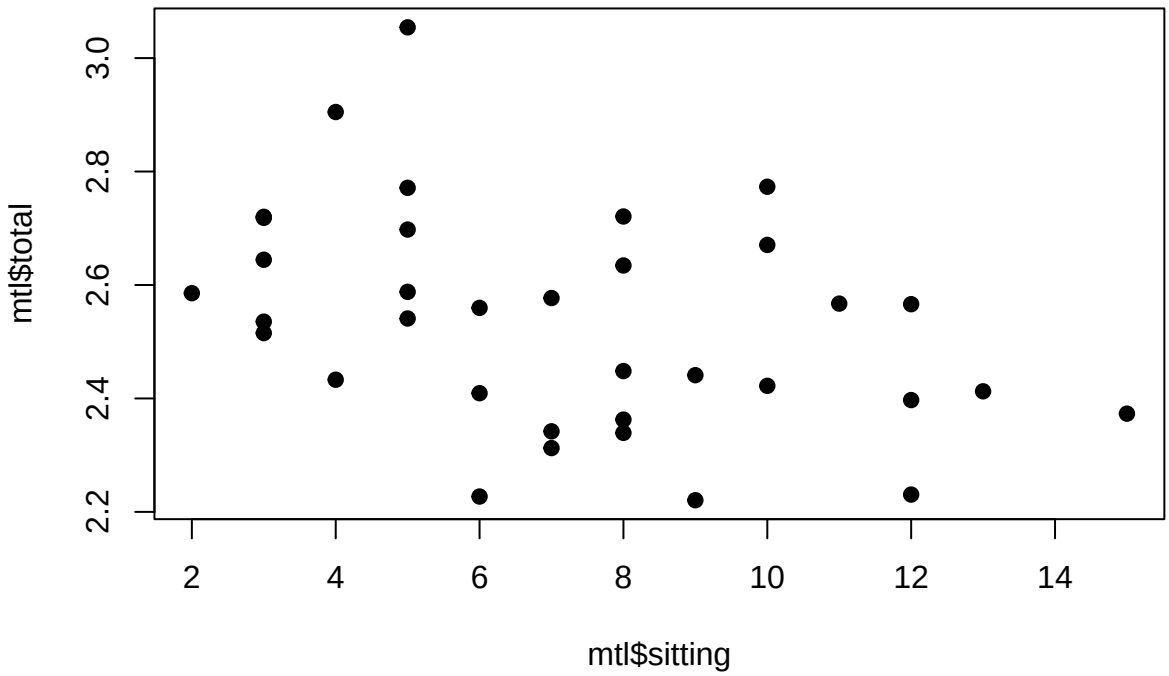
```
mtl = read.csv("https://github.com/TienChih/tbil-stats/raw/main/data/mtl.csv")

names(mtl)
```

```
##  [1] "subject"                          "sex"
##  [3] "ethnic"                           "educ"
##  [5] "e4grp"                            "age"
##  [7] "mmse"                             "ham_d"
##  [9] "ham_a"                            "dig_sym"
## [11] "delay_vp"                         "bfr_selective_reminding_delayed"
```

```
## [13] "sitting"                          "met_minwk"
## [15] "ipa_qgrp"                         "aca1"
## [17] "aca23dg"                          "ae_cort"
## [19] "a_fusi_cort"                      "a_ph_cort"
## [21] "a_pe_cort"                        "asubic"
## [23] "total"
```

a.

```
plot(mtl$sitting, mtl$total, pch=19)
```



b.

```
mtlmod=lm(total~sitting, data=mtl)
```

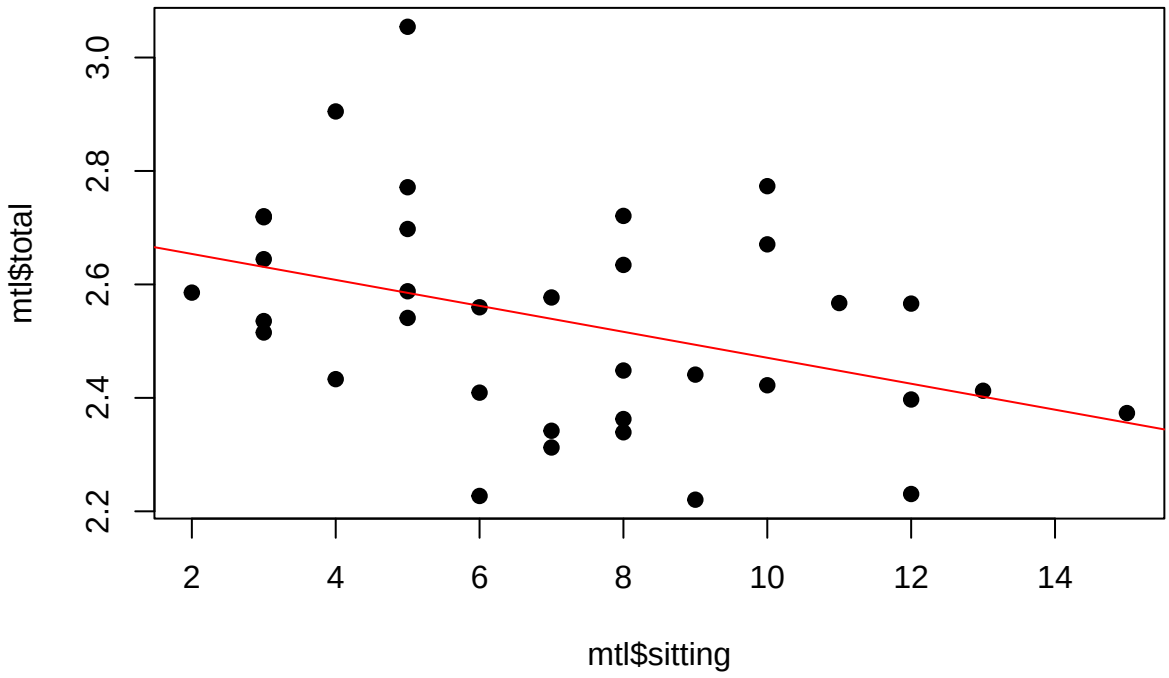
c.

```
cor(mtl$sitting, mtl$total)
```

```
## [1] -0.3958614
```

d.

```r
plot(mtl$sitting, mtl$total,  pch=19)
abline(mtlmod, col="red")
```



e.

```r
summary(mtlmod)
```

```
##
## Call:
## lm(formula = total ~ sitting, data = mtl)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.33511 -0.13432 -0.00252  0.11527  0.46907
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.69951    0.07309  36.933   <2e-16 ***
## sitting     -0.02288    0.00924  -2.476   0.0186 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1791 on 33 degrees of freedom
## Multiple R-squared:  0.1567, Adjusted R-squared:  0.1312
## F-statistic: 6.132 on 1 and 33 DF,  p-value: 0.01857
```

f. R = 0.4, weak relationship.
g. 15%
h. The relationship between MLT Thickness and hours sitting.
i. How thick the MLT is from hours sitting.
j. 2.425
k. 7.22

7.2.4

a. No, because those are not actually causally related
b. Both would sell better in the summer, which both are causally related

7.2.5

a. 117.24 inches
b. Because most people do not grow to be that tall, growth slows down after 12-16ish

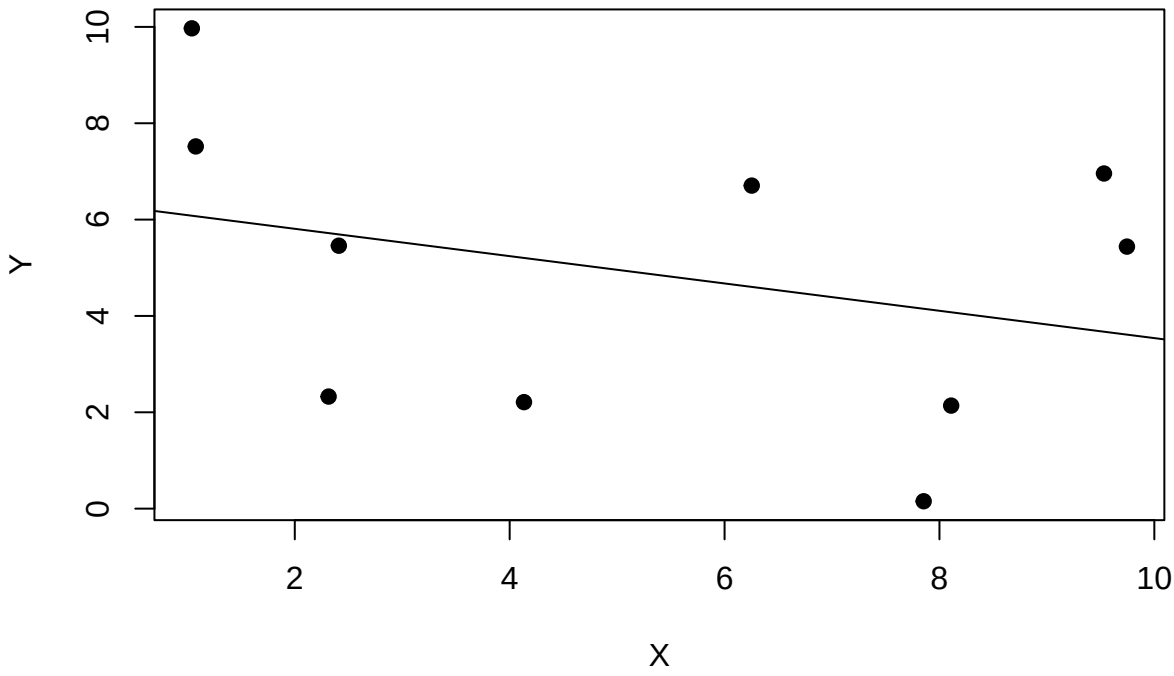
7.2.6

a.

```
n=10
X=runif(n, 0, 10)
Y=runif(n, 0, 10)
mod=lm(Y~X)
print(cor(X, Y))
```

```
## [1] -0.3196134
```

```
plot(X, Y, pch=19)
abline(mod)
```



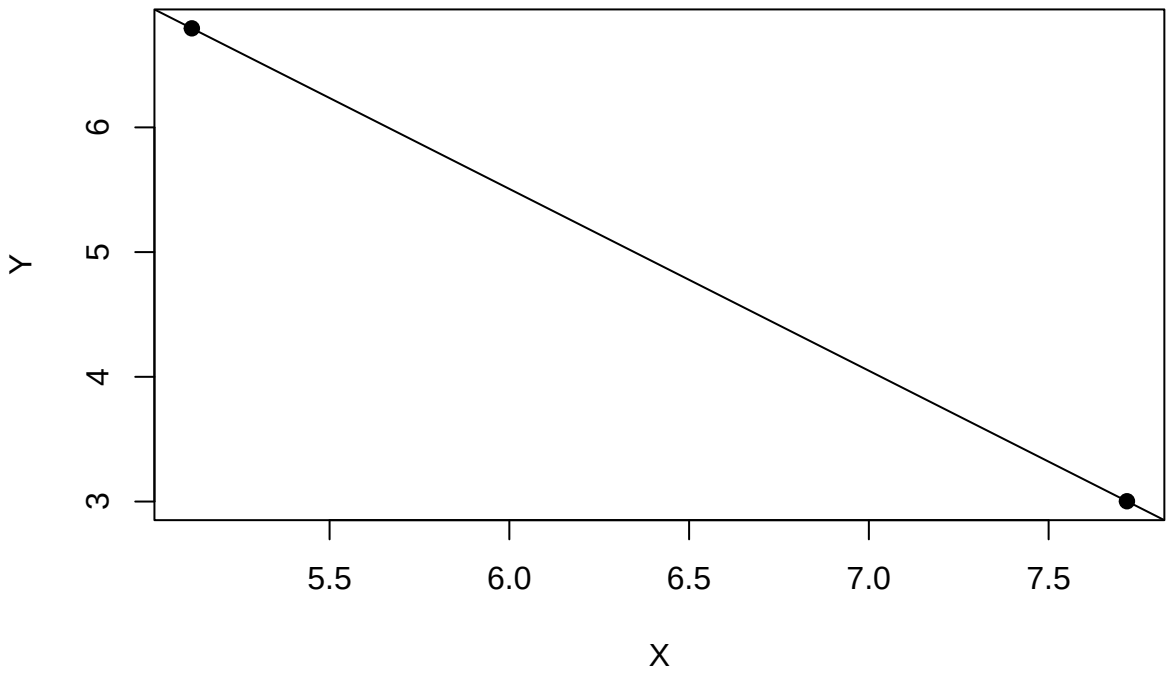
0.5 was the highest value I got.

b.

```
n=2
X=runif(n, 0, 10)
Y=runif(n, 0, 10)
mod=lm(Y~X)
print(cor(X, Y))
```

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

```
plot(X, Y, pch=19)
abline(mod)
```



It is related by 1