Hw05ST430Yu

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Question 1

```
software <- as_tibble(read_table("Datasets/software.txt",
            col_names = TRUE,
            ))
```

```
##
## -- Column specification --------------------------------------------------------
## cols(
##   Rep = col_double(),
##   Software = col_double(),
##   SalesLastQuarter = col_double(),
##   SalesThisQuarter = col_double()
## )
```

1A. Fit a model in which sales last quarter is ignored. We want to know whether software package has any effect on sales.

```
softwareslr <- lm(SalesThisQuarter~as.factor(Software),software)

summary(softwareslr)
```

```
##
## Call:
## lm(formula = SalesThisQuarter ~ as.factor(Software), data = software)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -19.583  -6.833   1.417   7.583  32.417
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)             81.583      3.281  24.866   <2e-16 ***
## as.factor(Software)2    -2.000      4.640  -0.431    0.669
## as.factor(Software)3    -7.667      4.640  -1.652    0.108
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
##
## Residual standard error: 11.37 on 33 degrees of freedom
## Multiple R-squared:  0.08176,    Adjusted R-squared:  0.02611
## F-statistic: 1.469 on 2 and 33 DF,  p-value: 0.2448
```

```
str(summary(softwareslr))
```

```
## List of 11
##  $ call         : language lm(formula = SalesThisQuarter ~ as.factor(Software), data = software)
##  $ terms        :Classes 'terms', 'formula'  language SalesThisQuarter ~ as.factor(Software)
##   .. ..- attr(*, "variables")= language list(SalesThisQuarter, as.factor(Software))
##   .. ..- attr(*, "factors")= int [1:2, 1] 0 1
##   .. .. ..- attr(*, "dimnames")=List of 2
##   .. .. .. ..$ : chr [1:2] "SalesThisQuarter" "as.factor(Software)"
##   .. .. .. ..$ : chr "as.factor(Software)"
##   .. ..- attr(*, "term.labels")= chr "as.factor(Software)"
##   .. ..- attr(*, "order")= int 1
##   .. ..- attr(*, "intercept")= int 1
##   .. ..- attr(*, "response")= int 1
##   .. ..- attr(*, ".Environment")=<environment: R_GlobalEnv>
##   .. ..- attr(*, "predvars")= language list(SalesThisQuarter, as.factor(Software))
##   .. ..- attr(*, "dataClasses")= Named chr [1:2] "numeric" "factor"
##   .. .. ..- attr(*, "names")= chr [1:2] "SalesThisQuarter" "as.factor(Software)"
##  $ residuals    : Named num [1:36] 8.42 1.42 -6.58 -19.58 32.42 ...
##   ..- attr(*, "names")= chr [1:36] "1" "2" "3" "4" ...
##  $ coefficients : num [1:3, 1:4] 81.58 -2 -7.67 3.28 4.64 ...
##   ..- attr(*, "dimnames")=List of 2
##   .. ..$ : chr [1:3] "(Intercept)" "as.factor(Software)2" "as.factor(Software)3"
##   .. ..$ : chr [1:4] "Estimate" "Std. Error" "t value" "Pr(>|t|)"
##  $ aliased      : Named logi [1:3] FALSE FALSE FALSE
##   ..- attr(*, "names")= chr [1:3] "(Intercept)" "as.factor(Software)2" "as.factor(Software)3"
##  $ sigma        : num 11.4
##  $ df           : int [1:3] 3 33 3
##  $ r.squared    : num 0.0818
##  $ adj.r.squared: num 0.0261
##  $ fstatistic   : Named num [1:3] 1.47 2 33
##   ..- attr(*, "names")= chr [1:3] "value" "numdf" "dendf"
##  $ cov.unscaled : num [1:3, 1:3] 0.0833 -0.0833 -0.0833 -0.0833 0.1667 ...
##   ..- attr(*, "dimnames")=List of 2
##   .. ..$ : chr [1:3] "(Intercept)" "as.factor(Software)2" "as.factor(Software)3"
##   .. ..$ : chr [1:3] "(Intercept)" "as.factor(Software)2" "as.factor(Software)3"
##  - attr(*, "class")= chr "summary.lm"
```

```
summary(softwareslr)$coefficients
```

```
##                      Estimate Std. Error    t value     Pr(>|t|)
## (Intercept)          81.583333   3.280933 24.8658957 5.997580e-23
## as.factor(Software)2 -2.000000   4.639940 -0.4310401 6.692419e-01
## as.factor(Software)3 -7.666667   4.639940 -1.6523203 1.079542e-01
```

```
summary(softwareslr)$coefficients[2,1]
```

```
## [1] -2
```

i. Write E(y/x).

- E(SalesThisQuarter/Software = 1) = 81.5833333.
- E(SalesThisQuarter/Software = 2) = 83.5833333.
- E(SalesThisQuarter/Software = 3) = 89.25.

Question 2

2.Download the "Explosives dataset" from Moodle. Fit a simple linear regression, relating the deflection of galvonometer (Y) to the area of the wires on the coupling (X). Complete the following parts.

```
pigs <- as_tibble(read_table("Datasets/pig.txt",
col_names = TRUE
))
```

```
##
## -- Column specification --------------------------------------------------------
## cols(
##   Drug = col_double(),
##   Momweight = col_double(),
##   Dadweight = col_double(),
##   Pigweight = col_double()
## )
```