HW8_Practice

2025-04-02

```
set.seed(1)
X = rnorm(n = 100)
epsilon = rnorm(n = 100)
```

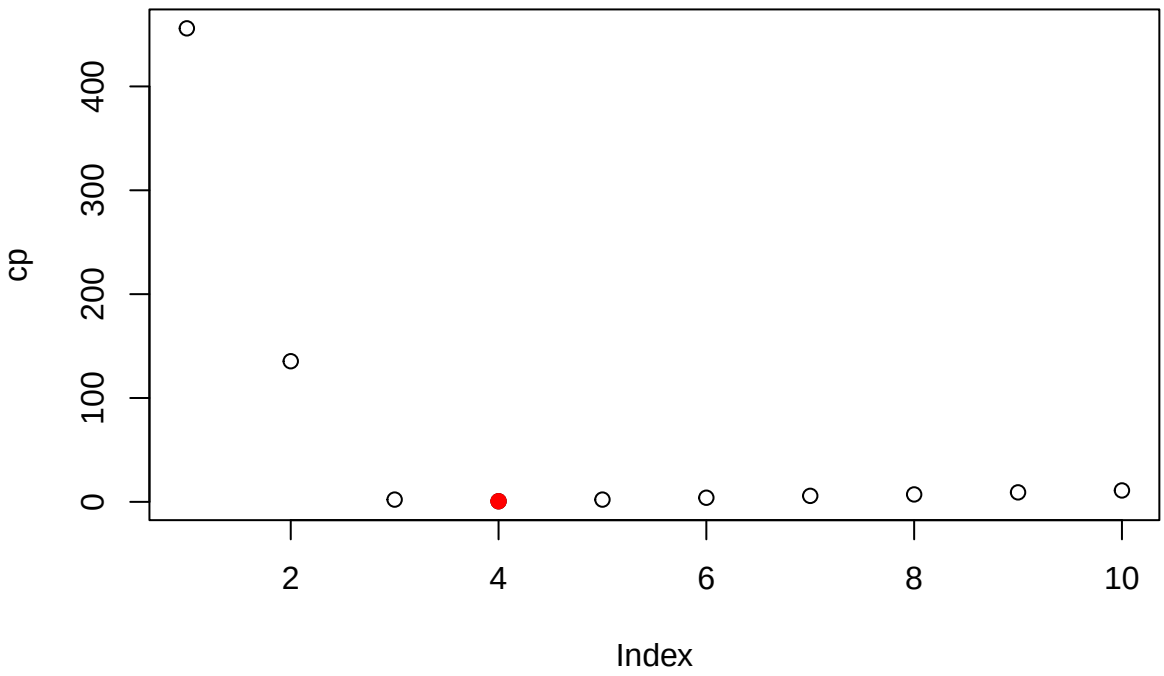
```
beta = rep(NA, 3)
beta0 = 2; beta[1] = 3; beta[2] = -1.5; beta[3] = -2
Y = beta0 + beta[1]*X + beta[2]*X^2 + beta[3]*X^3 + epsilon
```

```
library(leaps)
data = data.frame(Y=Y, X=X)
lm_fit = regsubsets(Y ~ poly(X, 10, raw=TRUE), data = data, nvmax=10)
lm_fit_summary = summary(lm_fit)
lm_fit_summary
```

```
## Subset selection object
## Call: regsubsets.formula(Y ~ poly(X, 10, raw = TRUE), data = data,
##     nvmax = 10)
## 10 Variables  (and intercept)
##                            Forced in Forced out
## poly(X, 10, raw = TRUE)1       FALSE      FALSE
## poly(X, 10, raw = TRUE)2       FALSE      FALSE
## poly(X, 10, raw = TRUE)3       FALSE      FALSE
## poly(X, 10, raw = TRUE)4       FALSE      FALSE
## poly(X, 10, raw = TRUE)5       FALSE      FALSE
## poly(X, 10, raw = TRUE)6       FALSE      FALSE
## poly(X, 10, raw = TRUE)7       FALSE      FALSE
## poly(X, 10, raw = TRUE)8       FALSE      FALSE
## poly(X, 10, raw = TRUE)9       FALSE      FALSE
## poly(X, 10, raw = TRUE)10      FALSE      FALSE
## 1 subsets of each size up to 10
## Selection Algorithm: exhaustive
##           poly(X, 10, raw = TRUE)1 poly(X, 10, raw = TRUE)2
## 1  ( 1 )  " "                      " "
## 2  ( 1 )  " "                      "*"
## 3  ( 1 )  "*"                      "*"
## 4  ( 1 )  "*"                      "*"
## 5  ( 1 )  "*"                      "*"
## 6  ( 1 )  "*"                      "*"
## 7  ( 1 )  "*"                      "*"
## 8  ( 1 )  "*"                      "*"
## 9  ( 1 )  "*"                      "*"
## 10  ( 1 ) "*"                      "*"
##           poly(X, 10, raw = TRUE)3 poly(X, 10, raw = TRUE)4
```

```
## 1  ( 1 )  " "                       " "
## 2  ( 1 )  " "                       " "
## 3  ( 1 )  "*"                       " "
## 4  ( 1 )  "*"                       " "
## 5  ( 1 )  "*"                       " "
## 6  ( 1 )  "*"                       " "
## 7  ( 1 )  "*"                       " "
## 8  ( 1 )  "*"                       "*"
## 9  ( 1 )  "*"                       "*"
## 10  ( 1 ) "*"                       "*"
##           poly(X, 10, raw = TRUE)5 poly(X, 10, raw = TRUE)6
## 1  ( 1 )  "*"                       " "
## 2  ( 1 )  "*"                       " "
## 3  ( 1 )  " "                       " "
## 4  ( 1 )  "*"                       " "
## 5  ( 1 )  "*"                       "*"
## 6  ( 1 )  " "                       " "
## 7  ( 1 )  "*"                       "*"
## 8  ( 1 )  " "                       "*"
## 9  ( 1 )  "*"                       "*"
## 10  ( 1 ) "*"                       "*"
##           poly(X, 10, raw = TRUE)7 poly(X, 10, raw = TRUE)8
## 1  ( 1 )  " "                       " "
## 2  ( 1 )  " "                       " "
## 3  ( 1 )  " "                       " "
## 4  ( 1 )  " "                       " "
## 5  ( 1 )  " "                       " "
## 6  ( 1 )  "*"                       "*"
## 7  ( 1 )  " "                       "*"
## 8  ( 1 )  " "                       "*"
## 9  ( 1 )  " "                       "*"
## 10  ( 1 ) "*"                       "*"
##           poly(X, 10, raw = TRUE)9 poly(X, 10, raw = TRUE)10
## 1  ( 1 )  " "                       " "
## 2  ( 1 )  " "                       " "
## 3  ( 1 )  " "                       " "
## 4  ( 1 )  " "                       " "
## 5  ( 1 )  " "                       " "
## 6  ( 1 )  "*"                       " "
## 7  ( 1 )  " "                       "*"
## 8  ( 1 )  "*"                       "*"
## 9  ( 1 )  "*"                       "*"
## 10  ( 1 ) "*"                       "*"
```

```r
cp = lm_fit_summary$cp
plot(cp)
# which.min(lm_fit_summary$cp)
points(which.min(cp), cp[which.min(cp)], col="red", pch=19)
```


cp
0
100
200
300
400
2
4
6
8
10
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