

R Code and Output

```
> sales.data
  sales displays locadv natadv
1  12.85      5.6   5.6   3.8
2  11.55      4.1   4.8   4.8
3  12.78      3.7   3.5   3.6
4  11.19      4.8   4.5   5.2
5   9.00      3.4   3.7   2.9
6   9.34      6.1   5.8   3.4
7  13.80      7.7   7.2   3.8
8   8.79      4.0   4.0   3.8
9   8.54      2.8   2.3   2.9
10  6.23      3.2   3.0   2.8
11 11.77      4.2   4.5   5.1
12  8.04      2.7   2.1   4.3
13  5.80      1.8   2.5   2.3
14 11.57      5.0   4.6   3.6
15  7.03      2.9   3.2   4.0
16  0.27      0.0   0.2   2.7
17  5.10      1.4   2.2   3.8
18  9.91      4.2   4.3   4.3
19  6.56      2.4   2.2   3.7
20 14.17      4.7   4.7   3.4
21  8.32      4.5   4.4   2.7
22  7.32      3.6   2.9   2.8
23  3.45      0.6   0.8   3.4
24 13.73      5.6   4.7   5.3
25  8.06      3.2   3.3   3.6
26  9.94      3.7   3.5   4.3
27 11.54      5.5   4.9   3.2
28 10.80      3.0   3.6   4.6
29 12.33      5.8   5.0   4.5
30  2.96      3.5   3.1   3.0
31  7.38      2.3   2.0   2.2
32  8.68      2.0   1.8   2.5
33 11.51      4.9   5.3   3.8
34  1.60      0.1   0.3   2.7
35 10.93      3.6   3.8   3.8
36 11.61      4.9   4.4   2.5
37 17.99      8.4   8.2   3.9
38  9.58      2.1   2.3   3.9
39  7.05      1.9   1.8   3.8
40  8.85      2.4   2.0   2.4
41  7.53      3.6   3.5   2.4
42 10.47      3.6   3.7   4.4
43 11.03      3.9   3.6   2.9
44 12.31      5.5   5.0   5.5
```

```

> library(leaps)
> attach(sales.data)

> regsub <- regsubsets(sales~.,data=sales.data,nbest=4,
method="exhaustive")
> summary(regsub)
Subset selection object
Call: regsubsets.formula(sales ~ ., data = sales.data,
nbest = 3, method = "exhaustive")
3 Variables (and intercept)
      Forced in Forced out
displays  FALSE      FALSE
locadv    FALSE      FALSE
natadv    FALSE      FALSE
4 subsets of each size up to 3
Selection Algorithm: exhaustive
      displays locadv natadv
1 ( 1 ) " "      "*"     " "
1 ( 2 ) "*"     " "     " "
1 ( 3 ) " "      " "     "*"
2 ( 1 ) "*"     " "     "*"
2 ( 2 ) " "      "*"     "*"
2 ( 3 ) "*"     "*"     " "
3 ( 1 ) "*"     "*"     "*"

> result1 <-
with(sales.data,leaps(cbind(displays,locadv,natadv),sales,m
ethod="r2", nbest=3))
> result1$r2
[1] 0.7097809 0.7085164 0.2247311 0.7374453 0.7296918
0.7183429 0.7416657

> result2 <-
with(sales.data,leaps(cbind(displays,locadv,natadv),sales,m
ethod="adjr2", nbest=3))
> result2$adjr2
[1] 0.7028709 0.7015763 0.2062723 0.7246377 0.7165061
0.7046036 0.7222906

> result3 <-
with(sales.data,leaps(cbind(displays,locadv,natadv),sales,m
ethod="Cp", nbest=3))
> result3$Cp
[1] 4.936985 5.132774 80.041187 2.653481 3.854008
5.611251 4.000000

```

```

> n <- nrow(sales.data)
> n
[1] 44
> SSE <- (1-result1$r2)*var(sales)*(n-1)
> AIC <- n*log(SSE) -n*log(n) +2*result1$size
> AIC
[1] 57.88644 58.07772 101.11968 55.47866 56.75920
58.56881 56.76564
> SBC <- n*log(SSE) -n*log(n) +2*result1$size
> SBC <- n*log(SSE) -n*log(n) +log(n)*result1$size
> SBC
[1] 61.45481 61.64610 104.68806 60.83123 62.11177
63.92138 63.90240

> reg1 <- lm(sales~locadv)
> summary(reg1)

```

Call:

```
lm(formula = sales ~ locadv)
```

Residuals:

Min	1Q	Median	3Q	Max
-5.4287	-1.2874	0.2027	1.0759	3.6742

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2.8315	0.6990	4.051	0.000215 ***
locadv	1.7926	0.1769	10.135	7.5e-13 ***

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

Residual standard error: 1.888 on 42 degrees of freedom
Multiple R-squared: 0.7098, Adjusted R-squared: 0.7029
F-statistic: 102.7 on 1 and 42 DF, p-value: 7.507e-13

```

> reg2<- lm(sales~displays+natadv)
> summary(reg2)

```

Call:

```
lm(formula = sales ~ displays + natadv)
```

Residuals:

Min	1Q	Median	3Q	Max
-5.5934	-1.0162	0.1808	1.1548	3.4955

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.0173	1.1978	0.849	0.4006
displays	1.5221	0.1701	8.948	3.45e-11 ***
natadv	0.7362	0.3464	2.125	0.0396 *

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

Residual standard error: 1.818 on 41 degrees of freedom
Multiple R-squared: 0.7374, Adjusted R-squared: 0.7246
F-statistic: 57.58 on 2 and 41 DF, p-value: 1.242e-12

```
> reg3 <- lm(sales~displays+locadv+natadv)
> summary(reg3)
```

Call:

```
lm(formula = sales ~ displays + locadv + natadv)
```

Residuals:

Min	1Q	Median	3Q	Max
-5.42165	-0.91151	0.07025	1.14200	3.54793

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.0233	1.2029	0.851	0.4000
displays	0.9657	0.7092	1.362	0.1809
locadv	0.6292	0.7783	0.808	0.4237
natadv	0.6760	0.3557	1.900	0.0646 .

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

Residual standard error: 1.825 on 40 degrees of freedom
Multiple R-squared: 0.7417, Adjusted R-squared: 0.7223
F-statistic: 38.28 on 3 and 40 DF, p-value: 7.821e-12

```
> anova(reg3)
```

Analysis of Variance Table

Response: sales

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
displays	1	365.56	365.56	109.7054	4.994e-13 ***
locadv	1	5.07	5.07	1.5215	0.22459
natadv	1	12.03	12.03	3.6113	0.06461 .
Residuals	40	133.29	3.33		
