Homework 5

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```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.0 --

## v ggplot2 3.3.3     v purrr   0.3.4
## v tibble  3.0.6     v dplyr   1.0.4
## v tidyr   1.1.2     v stringr 1.4.0
## v readr   1.4.0     v forcats 0.5.1

## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(mlbench)
library(ISLR)
library(caret)
```

```
## Loading required package: lattice

##
## Attaching package: 'caret'

## The following object is masked from 'package:purrr':
##
##     lift
```

```
library(e1071)
library(kernlab)
```

```
##
## Attaching package: 'kernlab'

## The following object is masked from 'package:purrr':
##
##     cross

## The following object is masked from 'package:ggplot2':
##
##     alpha
```

```
library(DALEX)
```

```
## Welcome to DALEX (version: 2.2.0).
## Find examples and detailed introduction at: http://ema.drwhy.ai/

##
## Attaching package: 'DALEX'

## The following object is masked from 'package:dplyr':
##
##     explain
```

```
data(OJ)
# partition the data into training set and test set
oj = OJ %>% mutate(Store7 = recode(Store7, '1' = 'Yes', '0' = 'No'), Store7 = as.numeric(Store7))
set.seed(1)
rowTrain <- createDataPartition(y = oj$Purchase, p =799/1070, list = FALSE)

train_df = oj[rowTrain,]
test_df = oj[-rowTrain,]

dim(train_df) #has 800 observations
```

```
## [1] 800  18
```

```
dim(test_df) #has 270 observations
```

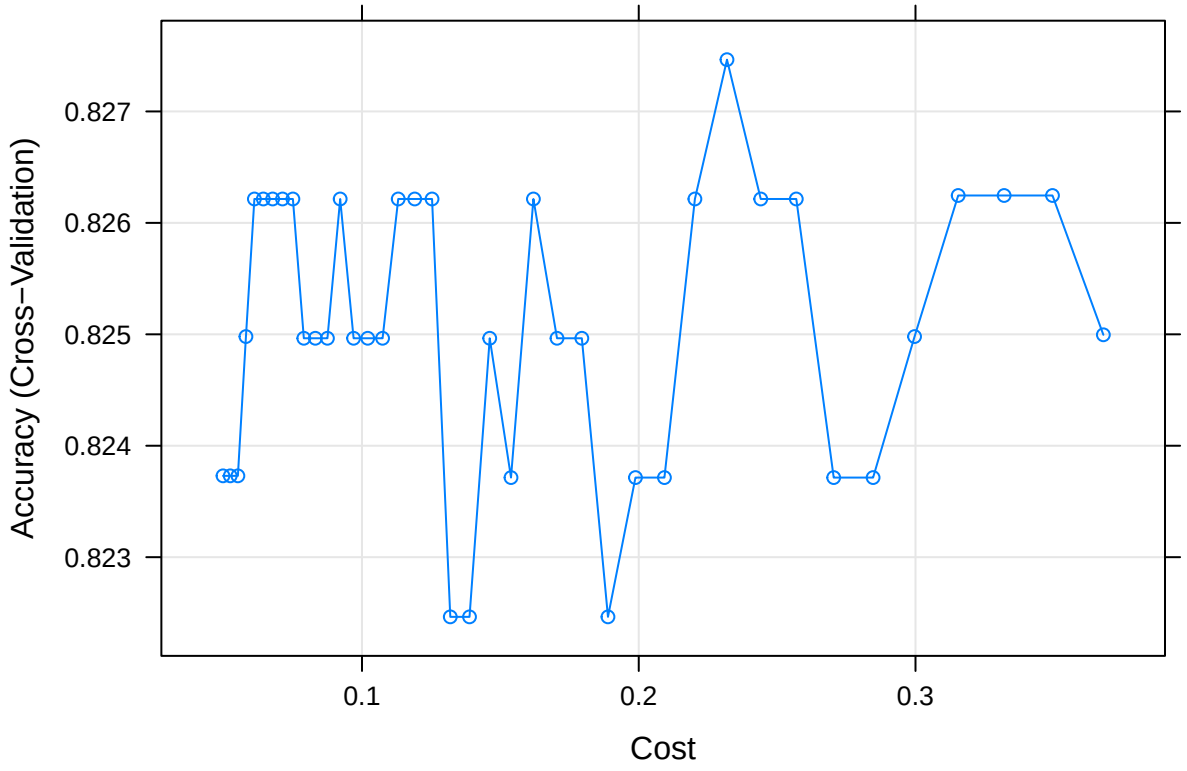
```
## [1] 270  18
```

(a)

```
ctrl <- trainControl(method = "cv")

set.seed(1)
svml.fit <- train(Purchase  ~ .,
                  data = train_df,
                  method = "svmLinear2",
                  preProcess = c("center", "scale"),
                  tuneGrid = data.frame(cost = exp(seq(-3,-1,len = 40))),
                  trControl = ctrl)

plot(svml.fit, highlight = TRUE)
```




```
#training error rate
mean(predict(svml.fit) != train_df$Purchase)
```

```
## [1] 0.16875
```

```
#test error rate
mean(predict(svml.fit, newdata = test_df) != test_df$Purchase)
```

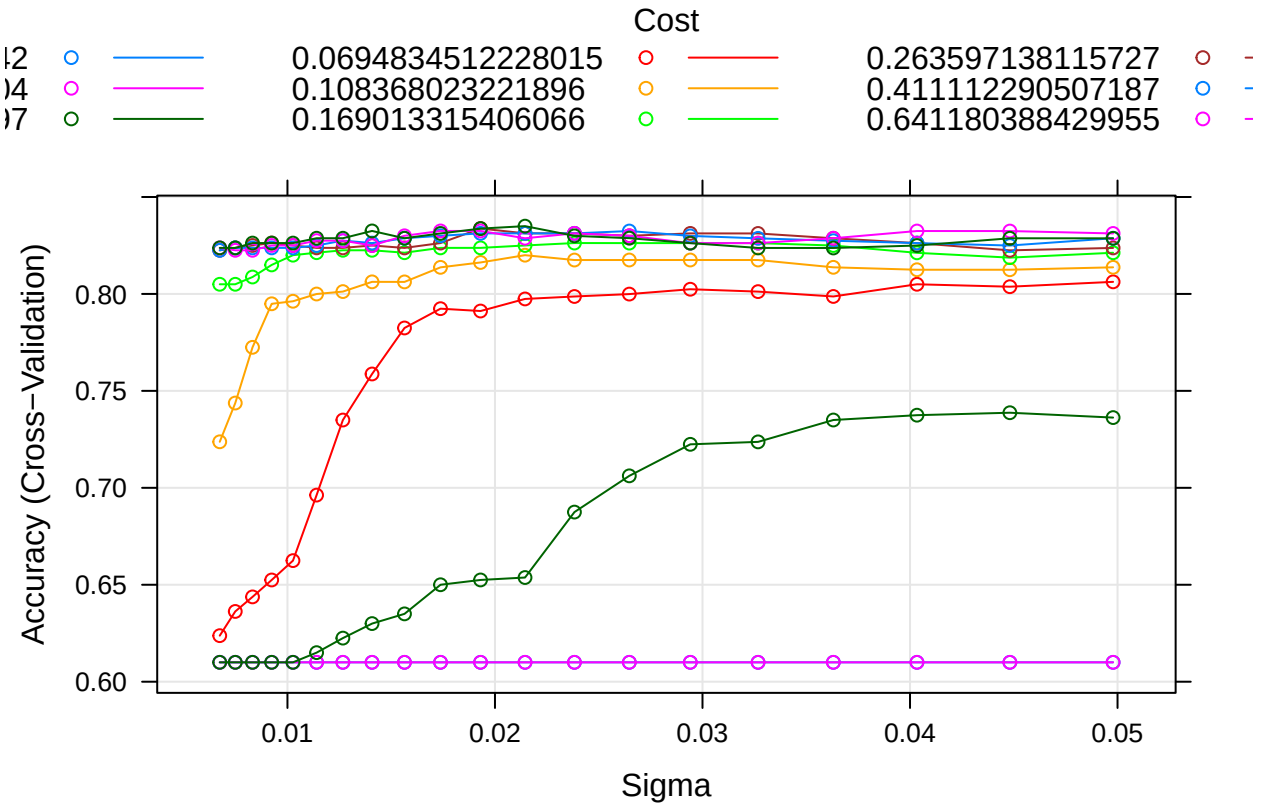
```
## [1] 0.1518519
```

The training error rate is 0.16875. The test error rate is 0.1518519.

(b)

```
svmr.grid <- expand.grid(C = exp(seq(-4,0,len=10)),
                         sigma = exp(seq(-5,-3,len=20)))
set.seed(1)
svmr.fit <- train(Purchase~.,
                  data = train_df,
                  method = "svmRadialSigma",
                  preProcess = c("center", "scale"),
                  tuneGrid = svmr.grid,
                  trControl = ctrl)

plot(svmr.fit, highlight = TRUE)
```




```
#training error rate
mean(predict(svmr.fit) != train_df$Purchase)
```

```
## [1] 0.15625
```

```
#test error rate
mean(predict(svmr.fit, newdata = test_df) != test_df$Purchase)
```

```
## [1] 0.1555556
```

The training error rate is 0.15625. The test error rate is 0.155.