Bayesian Data Analysis HW01

I have executed these exercises on my own and written the answers in my own words. Signed: Shashi Shankar

1.

For Model A, Given that p(x) = 1/4 Probability value for each face is the same constant value 1/4. Hence all the values of the bottom face of the tetrahedral die are equally likely. Hence this model has no bias.

P(x=1) = p(x=2) = p(x=3) = p(x=4) = 1/4

For Model B, Given that p(x) = x/10

p(x=1) = 1/10, p(x=2) = 2/10, p(x=3) = 3/10, p(x=4) = 4/10 As we can see that the higher the face value x, the higher the probability. So, the face with higher value of x is more likely than the other faces. Hence, the model is biased towards the higher values of x.

For Model x, Given that p(x) = 12/(25x)

p(x=1) = 12/25, p(x=2) = 12/50, p(x=3) = 12/75, p(x=4) = 12/100 As we can see that the more the face value, the lesser the probability. So, the face with low value of x is more likely than the other faces. Hence, the model is biased towards the lower values of x.

2.

In the first case, we get each face value of the die 25 times. That means the data is most consistent with model A which has equal and constant probability value for the faces. So we change our beliefs such that model A becomes the most credible. We lower the credibility of model B and C but keep their credibility values same as neither of them are more consistent with the experiment data than the other.

In the second case, the face with lower values are seen more often than the others.That means the data is most consistent with model C which is biased towards the lower value of the faces. So we change our beliefs such that model C becomes the most credible and model B becomes the least credible.

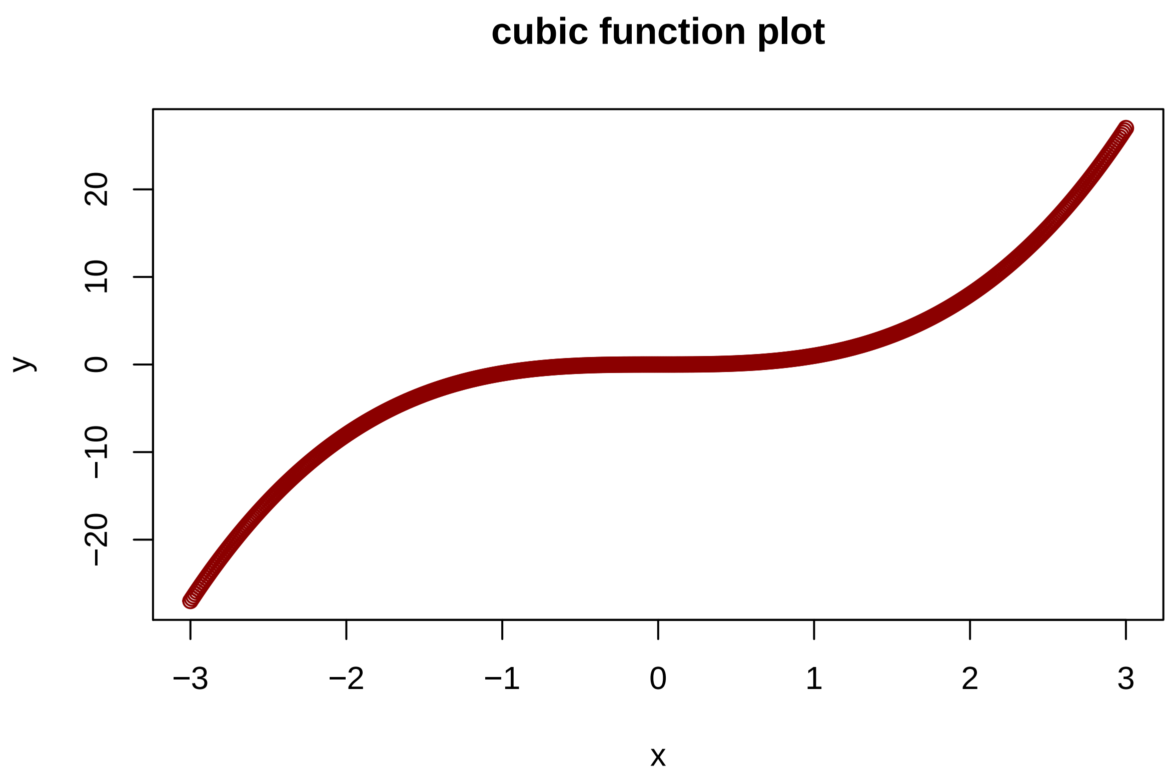
3.

```r
setwd('C:\\Users\\hoosi\\Desktop\\BDA\\DBDA2Eprograms') #set the working directory to DBDA2E
source('DBDA2E-utilities.R') #load utility code
```

```
##
## *********************************************************************
## Kruschke, J. K. (2015). Doing Bayesian Data Analysis, Second Edition:
## A Tutorial with R, JAGS, and Stan. Academic Press / Elsevier.
## *********************************************************************

## Loading required package: coda

## Linked to JAGS 4.2.0

## Loaded modules: basemod,bugs
```

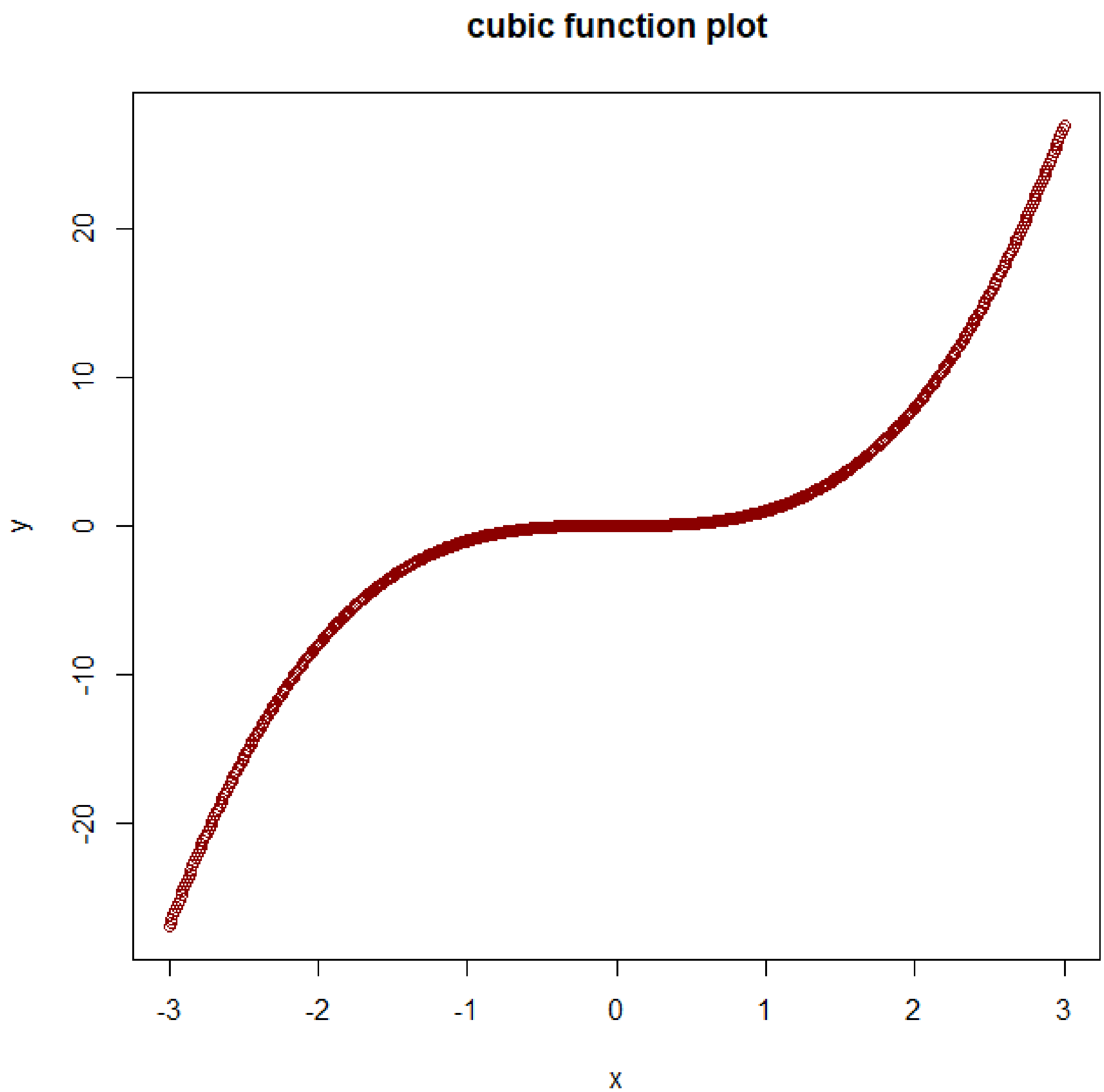
```r
openGraph() #open a graphic window with default values
x = seq(from = -3, to = 3, by = 0.01) #input vector
```

```
y = x^3 #cubic funtion
plot(x, y, type='b', col = 'dark red', main='cubic function plot')
```




```
saveGraph(file="cubicplot", type="png")
```

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.



##4A.

```
df = read.csv("HGN.csv")
df[1:3,]
```

```
##    Hair Gender Number  Name Group
## 1 black      M      2  Alex     1
## 2 brown      F      4 Betty     1
## 3 blond      F      3 Carla     1
```

4B.

```
head(df, 3)
```

```
##    Hair Gender Number  Name Group
## 1 black      M      2  Alex     1
## 2 brown      F      4 Betty     1
## 3 blond      F      3 Carla     1
```

4C.

```r
class(df$Group)
```

```
## [1] "integer"
```

4D.

```r
factor(df$Group)
```

```
## [1] 1 1 1 2 2 2 2
## Levels: 1 2
```

4E.

```r
df$Hair
```

```
## [1] black brown blond black black red   brown
## Levels: black blond brown red
```

```r
df['Hair']
```

```
##    Hair
## 1 black
## 2 brown
## 3 blond
## 4 black
## 5 black
## 6   red
## 7 brown
```

```r
df[1]
```

```
##    Hair
## 1 black
## 2 brown
## 3 blond
## 4 black
## 5 black
## 6   red
## 7 brown
```

5A.

```r
tempConvert <- function(F = 72){
  (F-32)*(5/9)
}
```

5B.

```r
tempConvert()
```

```
## [1] 22.22222
```

5C.

```r
tempConvert(98.6)
```

```
## [1] 37
```

5D.

```r
tempConvert(c( 32 , 72 , 98.6 , 212 ))
```

```
## [1]   0.00000  22.22222  37.00000 100.00000
```

It produced vector as an output because the input argument is a vector and it performed the temperature conversion over each input in the vector.