A) The built-in vector LETTERS contains the uppercase letters of the alphabet. Produce a vector of

(i) the first 12 letters;

A) LETTERS[1:12]

(ii) the odd 'numbered' letters;

```
for(i in 1:26){
      if(i %% 2 != 0){
            print(LETTERS[i])
                  }
            }
```

(iii) the (English) consonants.

```
for( i in LETTERS){
  if(i=='A' || i=='E' || i=='I' || i=='O' || i=='U'){
    }
  else{
    print(i)
}
}
```

A) The function rnorm() generates normal random variables. For instance, rnorm(10) gives a vectorof 10 i.i.d. standard normals. Generate 20 standard normals, and store them as x. Then obtain subvectors of

a. the entries in x which are less than 1;
b. the entries between − 0.5 and 1;
c. the entries whose absolute value is larger than 1.5.

```
data<- rnorm(n = 10)
print(data)
 summary(data)
```

B) Solve the following system of simultaneous equations using matrix methods.

a + 2b + 3c + 4d + 5e = −5
2a
+3b + 4c + 5d + e = 2
3a + 4b + 5c + d + 2e = 5
4a + 5b + c + 2d + 3e = 10

5a + b + 2c + 3d + 4e = 11

```
lm <- matrix(c(1,2,3,4,5,2,3,4,5,1,3,4,5,1,2,4,5,1,2,3,5,1,2,3,4),nrow=5)
rm <- matrix(c(-5,2,5,10,11),nrow =5)
solve(lm,rm)
```

C) Create a factor object for an apple color such as 'green', 'green', 'yellow', 'red', 'red', 'red',' green'. Print the factor and applying the nlevels function to know the number of distinct values

```
x <- c('green', 'green', 'yellow', 'red', 'red', 'red','green')
 fac <- factor(x)
print(fac)
print(nlevels(fac))
```

D) Create an S3 object of class fruit contains a list with following required components such as name, quantity, cost and also Define and create s4 objects.Define a reference class of fruit

```
setClass("ABOUT_FRUITS", fruits <- list(name="character",
Quantity="numeric",cost="numeric"))

fruit <- new("ABOUT_FRUITS", name = "banana", Quantity = 21, cost = 200)

fruit


fruits <- list(name=" apple",Quantity= 3,cost=100)
class(fruits) <- "ABOUT_FRUITS"
fruits
```

```
> fruit
An object of class "ABOUT_FRUITS"
Slot "name":
[1] "banana"

Slot "Quantity":
[1] 21

Slot "cost":
[1] 200

>
>
> fruits <- list(name=" apple",Quantity= 3,cost=100)
> class(fruits) <- "ABOUT_FRUITS"
> fruits
$name
[1] " apple"

$Quantity
[1] 3

$cost
[1] 100

attr(,"class")
[1] "ABOUT_FRUITS"
> fruits
```