Q1.Create the vectors.

a) c <- 2:30
print(c)

[1] 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 8 29 30

b) c <- 30:2
print(c)
[1] 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7
6 5 4 3 2

c) c <- c(1:30,seq(29,1,-1))

print(c)
[1] 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
26 27 28 29 30 29 28 [33] 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10
9 8 7 6 5 4 3 2 1

d) dev <- c(4,6,3)
print(dev)
[1] 4 6 3

e) rep(c(5,6,7),10)
[1] 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7

f) c(rep(c(5,6,7),10),5)
[1] 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5 6 7 5

g) rep(c(4,6,3),c(10,20,30))
[1] 4 4 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
[49] 3 3 3 3 3 3 3 3 3 3 3 3

Q2.Create a vector of the values of eX sin(x) at x = 3, 3.1, 3.2, , 6.
x <- seq(3,6,by=0.1)
z <- exp(x) * sin(x)
print(z)
[1] 2.8344711 0.9230055 -1.4320654 -4.2769020 -7.6570591 -11.6163451 -16.1954669
[8] -21.4304437 -27.3507725 -33.9773327 -41.3200162 -49.3750762 -58.1221905 -67.5212405
[15] -77.5088155 -87.9944570 -98.8566695 -109.9387348 -121.0443775 -131.9333449 -142.3169809
[22] -151.8538900 -160.1458060 -166.7338044 -171.0950158 -172.6400256 -170.7111690 -164.5819569
[29] -153.4578954 -136.4789910 -112.7242573

Q3.Execute the following lines which create two vectors of random integers which are chosen with replacement from the integers 0, 1, : : : , 999. Both vectors have length 250.
set.seed(100)
x <- Sample (0:999, 250, replace=T)
y <- Sample (0:999, 250, replace=T)

(a) Identify out the values in y which are > 500.

```
x <- sample(0:999,250,replace=T)
> y <- sample(0:999,250,replace=T)
> set.seed(100)
> z <- (y>500)
> print(z)
```

```
  [1] FALSE FALSE  TRUE  TRUE FALSE  TRUE FALSE FALSE FALSE  TRUE  TRUE  TRUE
 TRUE FALSE FALSE  TRUE  TRUE  TRUE
 [19]  TRUE FALSE  TRUE FALSE  TRUE  TRUE FALSE FALSE FALSE  TRUE FALSE  TRUE
 FALSE  TRUE FALSE FALSE FALSE  TRUE
 [37]  TRUE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE  TRUE
 TRUE FALSE  TRUE  TRUE FALSE  TRUE
 [55]  TRUE FALSE FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE  TRUE FALSE FALSE
 TRUE  TRUE FALSE  TRUE  TRUE  TRUE
 [73] FALSE  TRUE  TRUE  TRUE FALSE FALSE FALSE  TRUE FALSE FALSE  TRUE  TRUE FALSE
 FALSE FALSE  TRUE FALSE FALSE
 [91]  TRUE  TRUE  TRUE  TRUE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
 FALSE  TRUE  TRUE  TRUE FALSE
[109] FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE  TRUE FALSE  TRUE
 TRUE FALSE  TRUE FALSE FALSE
[127]  TRUE  TRUE FALSE  TRUE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE
 FALSE FALSE FALSE FALSE FALSE
[145] FALSE  TRUE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE
 FALSE  TRUE  TRUE FALSE  TRUE
[163]  TRUE  TRUE  TRUE  TRUE  TRUE FALSE  TRUE FALSE FALSE FALSE  TRUE FALSE  TRUE
 FALSE FALSE  TRUE FALSE FALSE
[181]  TRUE  TRUE FALSE FALSE  TRUE  TRUE FALSE  TRUE  TRUE  TRUE  TRUE FALSE  TRUE
 TRUE FALSE FALSE FALSE  TRUE
[199] FALSE  TRUE  TRUE FALSE FALSE FALSE FALSE  TRUE FALSE  TRUE FALSE FALSE FALSE
 FALSE FALSE  TRUE  TRUE  TRUE
[217]  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE  TRUE  TRUE  TRUE
 FALSE  TRUE FALSE FALSE FALSE
[235] FALSE FALSE  TRUE  TRUE FALSE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE FALSE FALSE
 FALSE  TRUE FALSE
```

(b) Identify the index positions in y of the values which are > 700?

```
print(y>700)
```

```
  [1] FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE
 FALSE FALSE FALSE FALSE FALSE  TRUE
 [19] FALSE FALSE  TRUE FALSE FALSE  TRUE FALSE FALSE FALSE  TRUE FALSE FALSE
 FALSE FALSE FALSE FALSE FALSE  TRUE
 [37] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE
  TRUE FALSE FALSE  TRUE FALSE  TRUE
 [55] FALSE FALSE FALSE FALSE  TRUE  TRUE FALSE FALSE FALSE  TRUE FALSE FALSE
 TRUE FALSE FALSE FALSE  TRUE FALSE
 [73] FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE  TRUE
 FALSE FALSE FALSE  TRUE FALSE FALSE
 [91]  TRUE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
  FALSE FALSE FALSE  TRUE  TRUE FALSE
[109] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE
  TRUE  TRUE FALSE  TRUE FALSE FALSE
[127]  TRUE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE
```

```
 FALSE FALSE FALSE FALSE FALSE FALSE
[145] FALSE  TRUE FALSE  TRUE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE
 FALSE FALSE FALSE  TRUE FALSE FALSE
[163]  TRUE  TRUE  TRUE  TRUE  TRUE FALSE  TRUE FALSE FALSE FALSE  TRUE FALSE
TRUE FALSE FALSE  TRUE FALSE FALSE
[181]  TRUE  TRUE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE
FALSE  TRUE FALSE FALSE FALSE  TRUE
[199] FALSE FALSE  TRUE FALSE FALSE FALSE FALSE  TRUE FALSE FALSE FALSE FALSE
 FALSE FALSE FALSE  TRUE FALSE  TRUE
[217] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
FALSE FALSE  TRUE FALSE FALSE FALSE
[235] FALSE FALSE FALSE FALSE FALSE  TRUE FALSE  TRUE  TRUE  TRUE  TRUE FALSE
FALSE FALSE  TRUE FALSE
```

Q4. Use the function paste to create the following character vectors of length 30:
(a) ("Label 1", "Label 2", ..., "Label 30").

*Note that there is a single space between label and the number following.

```
paste("Label",1:30,sep=" ")
 [1] "Label 1"  "Label 2"  "Label 3"  "Label 4"  "Label 5"  "Label 6"  "Label 7"  "Label 8"
 [9] "Label 9"  "Label 10" "Label 11" "Label 12" "Label 13" "Label 14" "Label 15" "Label 16"
[17] "Label 17" "Label 18" "Label 19" "Label 20" "Label 21" "Label 22" "Label 23" "Label 24"
[25] "Label 25" "Label 26" "Label 27" "Label 28" "Label 29" "Label 30"
```

(b) ("FN1", "FN2", ..., "FN30").

**In this case, there is no space between fn and the number following.

```
 paste("FN",1:30,sep="")
 [1] "FN1"  "FN2"  "FN3"  "FN4"  "FN5"  "FN6"  "FN7"  "FN8"  "FN9"  "FN10" "FN11" "FN12" "FN13"
[14] "FN14" "FN15" "FN16" "FN17" "FN18" "FN19" "FN20" "FN21" "FN22" "FN23" "FN24" "FN25" "FN26"
[27] "FN27" "FN28" "FN29" "FN30"
```

Q5. Compound interest can be computed using the formula
$A = P \times (1 + R/100)n$, where P is the original money lent, A is what it amounts to in n years at R percent per year
Interest.
Write R code to calculate the amount of money owed after n years, where n
changes from 1 to 15 in yearly increments, if the money lent originally is
10000 Rupees and the interest rate remains constant throughout the period
at 11.5%

```
 P <- 10000
 R <- 11.5
 n <- 1:15
 A <- P*(1+R/100)^n
 print(A)
 [1] 11150.00 12432.25 13861.96 15456.08 17233.53 19215.39 21425.16 23889.05 26636.29 29699.47
 [11] 33114.91 36923.12 41169.28 45903.75 51182.68
```

Q6) Generate the following matrices.

```
[,1] [,2] [,3] [,4]
[1,] 1 101 201 301
[2,] 2 102 202 302
[3,] 3 103 203 303
[4,] 4 104 204 304
[5,] 5 105 205 305
```

Sol:

```
x <- matrix(c(1:5,101:105,201:205,301:305),nrow=5,ncol=4)
print(x)
     [,1] [,2] [,3] [,4]
[1,]    1  101  201  301
[2,]    2  102  202  302
[3,]    3  103  203  303
[4,]    4  104  204  304
[5,]    5  105  205  305
```