Chapter 13 Answers

Highlights

- Review these functions
  - ifelse
  - sqrt
  - round
  - seq
  - matrix

13.1 Let `x` be a vector containing numerical elements, each of which is a positive integer. Write a single line of R code that replaces each element that is a perfect square with zero.

```
x <- 1:100
x <- ifelse((round(sqrt(x)) == sqrt(x)),0,x)
x
```

```
##   [1]  0  2  3  0  5  6  7  8  0 10 11 12 13 14 15  0 17 18 19 20 21 22 23
##  [24] 24  0 26 27 28 29 30 31 32 33 34 35  0 37 38 39 40 41 42 43 44 45 46
##  [47] 47 48  0 50 51 52 53 54 55 56 57 58 59 60 61 62 63  0 65 66 67 68 69
##  [70] 70 71 72 73 74 75 76 77 78 79 80  0 82 83 84 85 86 87 88 89 90 91 92
##  [93] 93 94 95 96 97 98 99  0
```

13.2 What is returned by the following R commands?

```
month.len = c(31,28,31,30,31,30,31,31,30,31,30,31)
month.abb[month.len < 30]
```

```
## [1] "Feb"
```

13.3 What is returned by the following R commands?

```
> x = seq(1,9, length.out=5)
> y = -1:3
> x[x <= y ^ 2]
```

```
x = seq(1,9, length.out=5)
x
```

```
## [1] 1 3 5 7 9
```

```
y = -1:3
y
```

```
## [1] -1  0  1  2  3
```

```
x <= y ^ 2
```

```
## [1]  TRUE FALSE FALSE FALSE  TRUE
```

```
x[x <= y ^ 2]
```

```
## [1] 1 9
```

13.4 Suppose that `x` is a vector of numeric elements. Write R commands that create a vector `y` of character elements that assume the character strings "positive", "zero", or "negative" associated with the corresponding values of `x`. For example, the `y` vector associated with `x = c(3, 5, 0, -7)` is `y = c("positive","positive","zero","negative")`.

```
x <- c(3, 5, 0, -7)
y <- ifelse(x==0,"zero",ifelse(x<0,"negative","positive"))
y
```

```
## [1] "positive" "positive" "zero"     "negative"
```

13.5 Let `x` be a vector that consists of numeric elements. Write a single R command to find the mean of the positive elements of `x`.

```
x <- c(-100,-100,-100,10,20,30,40,50)
mean(x)
```

```
## [1] -18.75
```

```
mean(x[x>0])
```

```
## [1] 30
```

```
x[x>0]
```

```
## [1] 10 20 30 40 50
```

13.6 Let `x` be a vector that consists of numeric elements. Write a single R command that returns a vector containing the subscripts of the positive elements of `x`.

```
x <- c(-100,-100,-100,10,20,30,40,50)
(1:length(x))[x>0]
```

```
## [1] 4 5 6 7 8
```

13.7 Write an R function named `DoubleTriple` with a single argument `mx`, which is a matrix that consists of integer-value elements. This function should return a matrix with the same dimensions as `mx`, but with odd-valued elements in `mx` doubled and even-valued elements in `mx` tripled.

```
DoubleTriple = function(mx) {
    return ( ifelse( (mx %% 2) == 1, mx*2, mx*3) )
}

mx_input <- matrix(1:2,12,12)
mx_input
```

```
##       [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10] [,11] [,12]
##  [1,]    1    1    1    1    1    1    1    1    1     1     1     1
##  [2,]    2    2    2    2    2    2    2    2    2     2     2     2
##  [3,]    1    1    1    1    1    1    1    1    1     1     1     1
##  [4,]    2    2    2    2    2    2    2    2    2     2     2     2
##  [5,]    1    1    1    1    1    1    1    1    1     1     1     1
##  [6,]    2    2    2    2    2    2    2    2    2     2     2     2
##  [7,]    1    1    1    1    1    1    1    1    1     1     1     1
##  [8,]    2    2    2    2    2    2    2    2    2     2     2     2
##  [9,]    1    1    1    1    1    1    1    1    1     1     1     1
## [10,]    2    2    2    2    2    2    2    2    2     2     2     2
## [11,]    1    1    1    1    1    1    1    1    1     1     1     1
## [12,]    2    2    2    2    2    2    2    2    2     2     2     2
```

```
y <- DoubleTriple(mx_input)
y
```

```
##       [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10] [,11] [,12]
##  [1,]    2    2    2    2    2    2    2    2    2     2     2     2
```

```
##  [2,]    6    6    6    6    6    6    6    6    6    6    6    6
##  [3,]    2    2    2    2    2    2    2    2    2    2    2    2
##  [4,]    6    6    6    6    6    6    6    6    6    6    6    6
##  [5,]    2    2    2    2    2    2    2    2    2    2    2    2
##  [6,]    6    6    6    6    6    6    6    6    6    6    6    6
##  [7,]    2    2    2    2    2    2    2    2    2    2    2    2
##  [8,]    6    6    6    6    6    6    6    6    6    6    6    6
##  [9,]    2    2    2    2    2    2    2    2    2    2    2    2
## [10,]    6    6    6    6    6    6    6    6    6    6    6    6
## [11,]    2    2    2    2    2    2    2    2    2    2    2    2
## [12,]    6    6    6    6    6    6    6    6    6    6    6    6
```

13.8 What is returned by the following R commands ?

```
A = matrix(1:15, nrow=3)
mean(A[1:2,3:4] > 10)
```

```
## [1] 0.25
```