

MOOC Course - Introduction to R Software

July 2021

Assignment 3

1. If $x = 123$ then which one of the following is the correct value of y after executing the command

```
y=if ( x==33 ) { x <- x^2 } else { x <- x^3 } ?
```

a. 1860867

b. 15129

c. 123

d. None of these

Solution:

```
R Console
> x = 123
> y=if ( x==33 ) { x <- x^2 } else { x <- x^3 }
> y
[1] 1860867
> |
```

2. Which one of the following is the correct syntax to compute y for the following function?

$$y = \begin{cases} 2x^2 + |x - 6| & \text{if } x \leq 0 \\ 3x^3 - \sqrt{x^5} & \text{if } x > 0 \end{cases}$$

a. `if (x <= 0) { y <- 2 * x^2 + abs(x - 6) } else (x > 0) {y <- 3 * x^3 - sqrt(x^5) }`

b. `if (x <= 0) (y <- 2 * x^2 + abs(x - 6)) else (y <- 3 * x^3 - sqrt(x^5))`

c. `if (x <= 0) (y < 2 * x^2 + abs(x - 6)) else (x > 0) (y < 3 * x^3)`

d. `if (x >= 0) { y <- 2 * x^2 } else (x > 0) { y <- 3 * x^3 - sqrt(x^5) }`

Solution:

```
R Console
> x=2
> if ( x <= 0 ) { y <- 2 * x^2 + abs(x - 6) } else (x > 0) {y <- 3 * x^3 - sqrt(x^5) }
Error: unexpected '(' in "if ( x <= 0 ) { y <- 2 * x^2 + abs(x - 6) } else (x > 0) {"
> if ( x <= 0 ) ( y <- 2 * x^2 + abs(x - 6) ) else ( y <- 3 * x^3 - sqrt(x^5))
[1] 18.34315
> if ( x <= 0 ) ( y < 2 * x^2 + abs(x - 6) ) else (x > 0) ( y < 3 * x^3 )
Error: attempt to apply non-function
> if ( x >= 0 ) { y <- 2 * x^2 } else (x > 0) { y <- 3 * x^3 - sqrt(x^5) }
Error: unexpected '(' in "if ( x >= 0 ) { y <- 2 * x^2 }else (x > 0) {"
> |
```

3. Suppose `x = c(2,4,6,8,10)` then which one of the following is the correct output of `ifelse(x<6, 2*x, 10*x)` ?

a. 20 40 12 16 20

b. 20 40 60 80 100

c. 4 8 12 16 20

d. 4 8 60 80 100

Solution:

```
R Console
> x = c(2,4,6,8,10)
> ifelse(x<6, 2*x, 10*x)
[1] 4 8 60 80 100
> |
```

4. Which one of the following is the correct outcome of

`for(i in 2:4) {print(1 + 2i)}` ?

a. 5 9 7

b.

```
[1] 1
```

```
[1] 2i
```

```
[1] 1+2i
```

c.

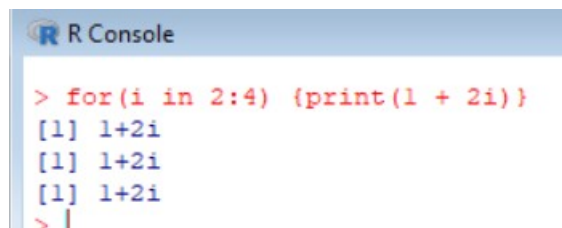
```
[1] 1+2i
```

```
[1] 1+2i
```

```
[1] 1+2i
```

d. Error...

Solution:



```
R Console
> for(i in 2:4) {print(1 + 2i)}
[1] 1+2i
[1] 1+2i
[1] 1+2i
> |
```

5. Which one of the following is the correct outcome of

```
for(i in 20:24) {print(i + 2*i)} ?
```

a.

```
[1] i+2i
```

```
[1] i+2i
```

```
[1] i+2i
```

```
[1] i+2i
```

```
[1] i+2i
```

b.

```
[1] 60
```

```
[1] 63
```

```
[1] 66
```

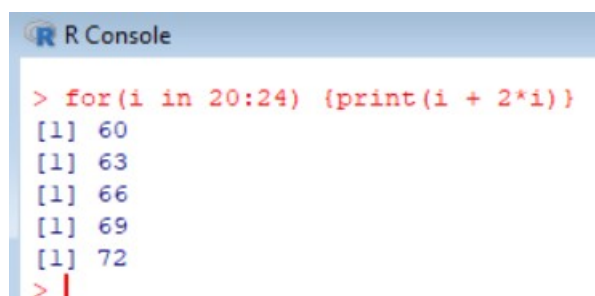
```
[1] 69
```

```
[1] 72
```

c. **Error...**

d. None of these

Solution:



```
R Console
> for(i in 20:24) {print(i + 2*i)}
[1] 60
[1] 63
[1] 66
[1] 69
[1] 72
> |
```

6. Which one of the following is the correct outcome of the following commands about while loop?

```
z <- 3
```

```
while (z < 15) {  
  print(c("R Course","is helpful."))  
  z = z + 2  
  print(c("R Course","is not helpful."))  
  z = z + 1  
}
```

a.

```
[1] "R Course"      "is not helpful."  
[1] "R Course"      "is helpful."  
[1] "R Course"      "is not helpful."  
[1] "R Course"      "is helpful."  
[1] "R Course"      "is not helpful."  
[1] "R Course"      "is helpful."  
[1] "R Course"      "is not helpful."  
[1] "R Course"      "is helpful."
```

b.

```
[1] "R Course"      "is helpful." "R Course"      "is not  
helpful." "R Course"      "is helpful." "R Course"      "is  
not helpful." "R Course"      "is helpful." "R Course"  
"is not helpful." "R Course"      "is helpful." "R Course"  
"is not helpful."
```

c.

```
[1] "R Course"      "is helpful."  
[1] "R Course"      "is not helpful."  
[1] "R Course"      "is helpful."  
[1] "R Course"      "is not helpful."  
[1] "R Course"      "is helpful."  
[1] "R Course"      "is not helpful."  
[1] "R Course"      "is helpful."  
[1] "R Course"      "is not helpful."
```

d. None of these

Solution:

```
R Console
> z <- 3
> while (z < 15) {
+   print(c("R Course", "is helpful."))
+   z = z + 2
+   print(c("R Course", "is not helpful."))
+   z = z + 1
+ }
[1] "R Course"      "is helpful."
[1] "R Course"      "is not helpful."
[1] "R Course"      "is helpful."
[1] "R Course"      "is not helpful."
[1] "R Course"      "is helpful."
[1] "R Course"      "is not helpful."
[1] "R Course"      "is helpful."
[1] "R Course"      "is not helpful."
> |
```

7. Which one of the following is the correct outcome of the following while loop?

```
x <- 10
```

```
while(x < 50) {x <- x+10; if (x == 40) break; print(x^2); }
```

a.

```
[1] 400
```

```
[1] 900
```

b.

```
[1] 1600
```

```
[1] 2500
```

c.

```
[1] 20
```

```
[1] 30
```

d.

```
[1] 20
```

```
[1] 30
```

```
[1] 40
```

[1] 50

Solution:

```
R Console
> x <- 10
> while(x < 50) {x <- x+10; if (x == 40) break; print(x^2); }
[1] 400
[1] 900
> |
```

8. Which one of the following is the correct outcome of the command

`abs(seq(-2,2))`?

- a. 2 1 0 1 2
- b. 0 1 2
- c. -2 -1 0 1 2
- d. None of these

Solution:

```
R Console
> abs(seq(-2,2))
[1] 2 1 0 1 2
> |
```

9. Which one of the following is the correct output of the command

`sqrt(abs(seq(-6,6, by = 3)))` ?

- a. 0.000000 1.732051 2.449490
- b. 2.449490 1.732051 0.000000 1.732051 2.449490
- c. -2.449490 -1.732051 0.000000 1.732051 2.449490
- d. None of these

Solution:

```
R Console
> sqrt(abs(seq(-6,6, by = 3)))
[1] 2.449490 1.732051 0.000000 1.732051 2.449490
> |
```

10. Which one of the following is the correct output of the command `seq(18,-18, by = -5)`?

- a. -17 -12 -7 -2 3 8 13 18
- b. -17 -12 -7 -3 3 7 12 17
- c. 17 12 7 3 -3 -7 -12 -17

d. 18 13 8 3 -2 -7 -12 -17

Solution:

```
R Console
> seq(18,-18, by = -5)
[1] 18 13 8 3 -2 -7 -12 -17
> |
```

11. Which one of the following is the correct output of the command `seq(to = 100, length = 8)`?

a. 30 40 50 60 70 80 90 100

b. 93 94 95 96 97 98 99 100

b. 100 99 98 97 96 95 94 93

d. 101 102 103 104 105 106 107 108

Solution:

```
R Console
> seq(to = 100, length = 8)
[1] 93 94 95 96 97 98 99 100
> |
```

12. Which one of the following is the correct output of the command `seq(to = -20, length = 10)` ?

- a. -29 -28 -27 -26 -25 -24 -23 -22 -21 -20
- b. -20 -21 -22 -23 -24 -25 -26 -27 -28 -29
- c. 20 21 22 23 24 25 26 27 28 29
- d. None of these

Solution:

```
R Console
> seq(to = -20, length = 10)
[1] -29 -28 -27 -26 -25 -24 -23 -22 -21 -20
> |
```

13. Which one of the following is the correct output of the command `seq(to = 22, length = 5, by = 6)` ?

- a. 2 4 10 16 22
- b. 22 16 10 4 2
- c. -2 4 10 16 22

d. None of these

Solution:

```
R Console
> seq(to = 22, length = 5, by = 6)
[1] -2  4 10 16 22
> |
```

14. Which one of the following is the correct output of the command

`seq(from = -10, length = 5, by = -0.3) ?`

a. -11.2 -10.9 -10.6 -10.3 -10.0

b. -10.0 -10.3 -10.6 -10.9 -11.2

c. 10.0 10.3 10.6 10.9 11.2

d. 11.2 10.9 10.6 10.3 10.0

Solution:

```
R Console
> seq(from = -10, length = 5, by = -0.3)
[1] -10.0 -10.3 -10.6 -10.9 -11.2
> |
```

15. Which one of the following is the correct output of `x` for the following commands

`Y <- c(90, 77, 51, 20, 30, 60, 89)`

`X <- seq(along = Y) ?`

a. 1 2 3 4 5 6 7

b. 7 5 3 1 2 4 6

c. 7 6 5 4 3 2 1

d. None of these

Solution:

```
R Console
> Y <- c(90, 77, 51, 20, 30, 60, 89)
> X <- seq(along = Y)
> X
[1] 1 2 3 4 5 6 7
> |
```

16. Which one of the following is the correct output of `Y[X[2]]` and `Y[X[6]]` for the command

```
Y <- c(900, 717, 251, 280, 302, 670, 897)
X <- seq(along = Y) ?
```

- a. 3 and 4 respectively.
- b. 4 and 3 respectively.
- c. 670 and 717 respectively.
- d. 717 and 670 respectively.

Solution:

```
R Console
> Y <- c(900, 717, 251, 280, 302, 670, 897)
> X <- seq(along = Y)
> Y[X[2]]
[1] 717
> Y[X[6]]
[1] 670
> |
```

17. Which one of the following is the correct command to generate a sequence of three yearly dates 1-Jan-2015, 1-Jan-2016 and 1-Jan-2017?

- a. `seq(as.Date("2015-01-01"), as.Date("2017-01-01"), by = "years")`
- b. `seq(as.date("2015-01-01"), as.date("2016-01-01"), as.date("2017-01-01"), by = "years")`
- c. `seq(as.Date(`2015-01-01`), as.Date(`2017-01-01`), by = `1`)`
- d. `seq(As.Date("2015-01-01"), As.Date("2017-01-01"), by = "years")`

Solution:

```
R Console
> seq(as.Date("2015-01-01"), as.Date("2017-01-01"), by = "years")
[1] "2015-01-01" "2016-01-01" "2017-01-01"
> seq(as.date("2015-01-01"), as.date("2016-01-01"), as.date("2017-01-01"), by = "years")
Error in as.date("2015-01-01") : could not find function "as.date"
> seq(as.Date(`2015-01-01`), as.Date(`2017-01-01`), by = `1`)
Error: unexpected numeric constant in "seq(as.Date(`2015-01-01`), as.Date(`2017-01-01`)"
> seq(As.Date("2015-01-01"), As.Date("2017-01-01"), by = "years")
Error in As.Date("2015-01-01") : could not find function "As.Date"
> |
```

18. Which one of the following is the correct command to generate the dates of 9 consecutive months starting from 5 Jan 2021?

- a. `seq(As.Date("2021-01-05"), by = "months", length = 9)`
- b. `seq(as.date("2021-01-05"), by = "months", length = 9)`
- c. `seq(as.Date("2021-01-05"), by = "months", length = 9)`
- d. `seq(as.Date("2021-01-05") to as.Date("2021-09-05") by = "9")`

Solution:

```
R Console
> seq(as.Date("2021-01-05"), by = "months", length = 9)
[1] "2021-01-05" "2021-02-05" "2021-03-05" "2021-04-05" "2021-05-05" "2021-06-05" "2021-07-05"
[8] "2021-08-05" "2021-09-05"
> seq(As.Date("2021-01-05"), by = "months", length = 9)
Error in As.Date("2021-01-05") : could not find function "As.Date"
> seq(as.date("2021-01-05"), by = "months", length = 9)
Error in as.date("2021-01-05") : could not find function "as.date"
> seq(as.Date("2021-01-05") to as.Date("2021-09-05") by = "9")
Error: unexpected symbol in "seq(as.Date("2021-01-05") to"
> |
```

19. Which one of the following is the correct outcome of the command

`letter[1:3]` ?

- a. `"a" "b" "c"`
- b. `"A" "B" "C"`
- c. `"4" "5"`

d. `Error...`

Solution:

```
R Console
> letter[1:3]
Error: object 'letter' not found
> |
```

20. Which one of the following is the correct outcome of the command

`LETTERS[18:12]` ?

- a. `"r" "q" "p" "o" "n" "m" "l"`
- b. `"R" "Q" "P" "O" "N" "M" "L"`
- c. `"L" "M" "N" "O" "P" "Q" "R"`

d. `Error...`

Solution:

```
R Console
> LETTERS[18:12]
[1] "R" "Q" "P" "O" "N" "M" "L"
> |
```

21. Which one of the following is the correct outcome of the command `rep(2:5,4)` ?

- a. 2 2 2 2 3 3 3 3 4 4 4 4 5 5 5 5
- b. 2 3 3 4 4 4 5 5 5 5
- c. 2 3 4 5 2 3 4 5 2 3 4 5 2 3 4 5
- d. 2:5 2:5 2:5 2:5

Solution:

```
R Console
> rep(2:5,4)
[1] 2 3 4 5 2 3 4 5 2 3 4 5 2 3 4 5
> |
```

22. Which one of the following is the correct outcome of the command

`rep(70:65, times=3)` ?

- a. 70 69 68 67 66 65 70 69 68 67 66 65 70 69 68 67 66 65
- b. 65 66 67 68 69 70 65 66 67 68 69 70 65 66 67 68 69 70
- c. 70 69 68 67 66 65 65 66 67 68 69 70 70 69 68 67 66 65
- d. 65 66 67 68 69 70 70 69 68 67 66 65 65 66 67 68 69 70

Solution:

```
R Console
> rep(70:65, times=3)
[1] 70 69 68 67 66 65 70 69 68 67 66 65 70 69 68 67 66 65
> |
```

23. Which one of the following is the correct outcome of the command

`rep(20:25, each=3)` ?

- a. 20 21 22 23 24 25 20 21 22 23 24 25 20 21 22 23 24 25

b. 20 20 20 21 21 21 22 22 22 23 23 23 24 24 24 25 25 25

c. 20:25 20:25 20:25

d. 25 25 25 24 24 24 23 23 23 20 20 20 22 22 22 21 21 21

Solution:

```
R Console
> rep(20:25, each=3)
[1] 20 20 20 21 21 21 22 22 22 23 23 23 24 24 24 25 25 25
> |
```

24. Which one of the following is the correct outcome of the commands

```
x <- matrix(nrow=2, ncol=2, data=1:4, byrow=T)
```

```
rep(x, each=3) ?
```

a. 1 1 1 4 4 4 3 3 3 2 2 2

b. 1 1 1 3 3 3 2 2 2 4 4 4

c. 1 2 3 4 1 2 3 4 1 2 3 4

d. None of these

Solution:

```
R Console
> x <- matrix(nrow=2, ncol=2, data=1:4, byrow=T)
> rep(x, each=3)
[1] 1 1 1 3 3 3 2 2 2 4 4 4
> |
```

25. Which one of the following is the correct outcome of the command

```
rep(c("name1", "name2", "name3"), each=2) ?
```

a. "name1" "name1" "name2" "name2" "name3" "name3"

b. "name1" "name2" "name3" "name1" "name2" "name3"

c. name 1 2 3 name 1 2 3

d. name 1 1 name 2 2 name 3 3

Solution:

```
R Console
> rep(c("name1", "name2", "name3"), each=2)
[1] "name1" "name1" "name2" "name2" "name3" "name3"
> |
```

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Answers of Assignment 3

1. a

2. b

3. d

4. c

5. b

6. c

7. a

8. a

9. b

10. d

11. b

12. a

13. c

14. b

15. a

16. d

17. a

18. c

19. d

20. b

21. c

22. a

23. b

24. b

25. a