**R-Introduction:**

***Definition:***

* **R is an interpreted programming language** used to analyze **statistical information, graphical representation, reporting,** and **data modeling.**
* R is the implementation of the**S programming** language, which is combined with **lexical scoping semantics.**
* Its most common use is to analyze and visualize data. R generally comes with the Command-line interface.

***Evolution of R:***

* R programming language was designed by **Ross Ihaka and Robert Gentleman** at the University of Auckland, New Zealand.
* The R Development Core Team currently develops R.

***Why R programming Language:***

* R programming is an open-source free language which is currently one of the most requested programming language in the Data Science job market.
* R is a a platform-independent language and it is used as a leading tool for machine learning, statistics, and data analysis.
* R programming language allows us to integrate with other languages (C, C++) and it has a vast community of users and it’s growing day by day.

***Advantages of R:***

* R programming is platform independent which runs on any operating systems.
* In R, everyone is welcome to provide new packages, bug fixes, and code enhancements.

***Disadvantages of R:***

* In the R programming language, the standard of some packages is less than perfect.
* Although, R commands give little pressure to memory management. So R programming language may consume all available memory.

***Applications of R:***

* We use R for Data Science.
* R is used by many quantitative analysts as its programming tool.
* Tech giants like Google, Facebook, bing, Accenture, Wipro and many more using R nowadays.

**R installation:**

**R programming** is a very popular language and to work on that we have to install two things, i.e., R and RStudio. R and RStudio works together to create a project on R.

***Installation of R:***

1. First, we have to download the R setup from <https://cloud.r-project.org/bin/windows/base/>.
2. When we click on **Download R for windows**, our downloading will be started of R setup. Once the downloading is finished, we have to run the setup of R in the following way:

* Select the path where we want to download the R and proceed to Next.
* Select all components which we want to install, and then we will proceed to **Next.**
* In the next step, we have to select either customized start-up or accept the default, and then we proceed to **Next**.
* When we proceed to next, our installation of R in our system will get started.
* In the last, we will click on finish to successfully install R in our system.

***Installation of RStudio:***

1. First, we have to visit the RStudio official site.

([https://rstudio.com/products/rstudio/download/](https://rstudioproject.com/products/rstudio/download/))

1. Select the RStudio desktop for open-source license and click on download.
2. Select the appropriate installer and download it. Once the downloading is finished, we have to run the setup of R in the following way:

* Click on Next on welcome page.
* Click on Install.
* Click on Finish.

1. Now, RStudio is ready to work.

**some basic commands and output:**

***Mathematical Functions:***

|  |  |  |  |
| --- | --- | --- | --- |
| **FUNCTION** |  | **INPUT** | **OUTPUT** |
| abs(x) | abs(-10) | 10 |
| log(x, base=y) | log(100, base=10) | 2 |
| exp(x) | exp(5) | 148.4132 |
| sqrt(x) | sqrt(25) | 5 |
| factorial(x) | factorial(3) | 6 |
| pi | pi | 3.141593 |

***Logical Functions:***

|  |  |  |  |
| --- | --- | --- | --- |
| **FUNCTION** |  | **INPUT** | **OUTPUT** |
| Greater than | 5>6 | FALSE |
| Less than | 4<5 | TRUE |
| Less than and Equal to | 12<=10 | FALSE |
| Greater than and Equal to | 19>=15 | TRUE |
| Equal to | 7==8 | FALSE |
| Not equal to | 13!=14 | TRUE |
| AND | 3 & 4 | TRUE |
| OR | 3 | 4 | TRUE |
| NOT | !3 | FALSE |

***Other Functions:***

|  |  |  |  |
| --- | --- | --- | --- |
| **FUNCTION** |  | **INPUT** | **OUTPUT** |
| Colon (:) | 1:6 | 1 2 3 4 5 6 |
| %in% | 5 %in% 6  5 %in% 5 | FALSE  TRUE |