

# R PROGRAMMING LAB

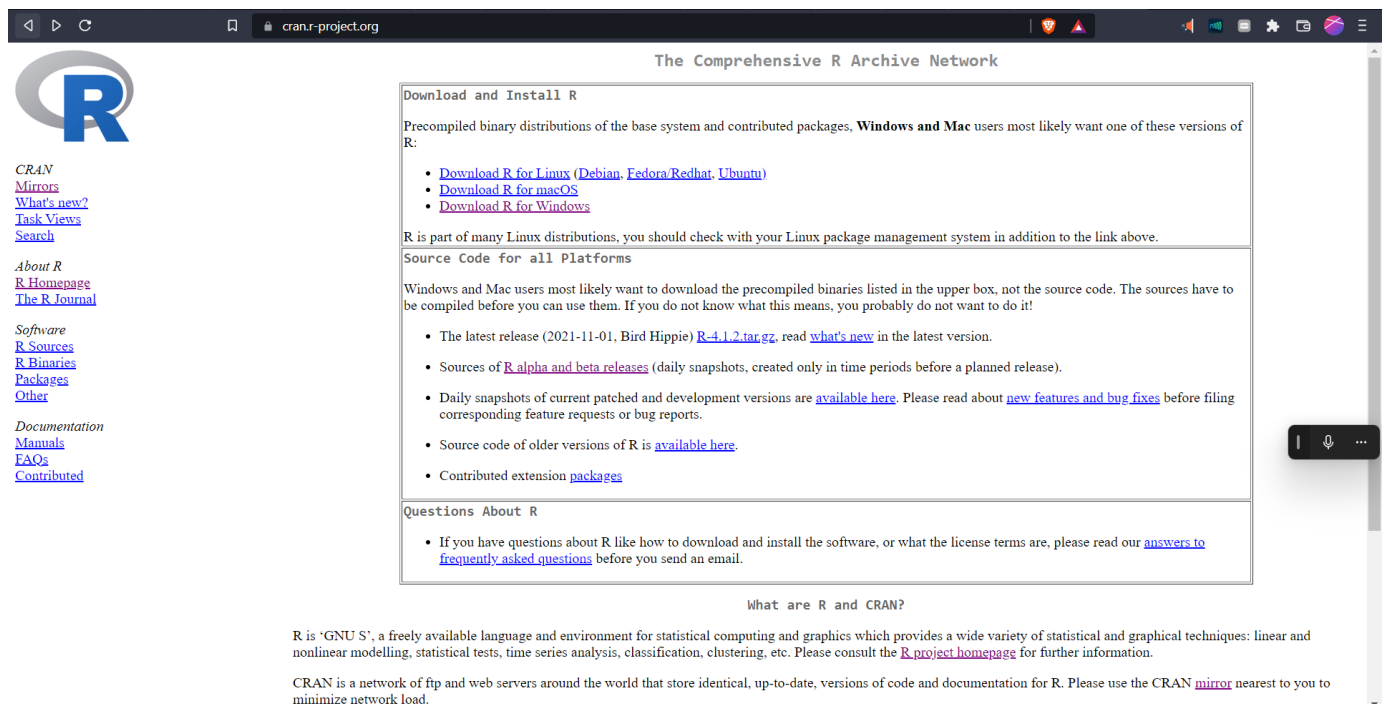
## Week 1

### Installing R and RStudio on Windows

To install R and RStudio on windows, go through the following steps:

#### Install R on windows

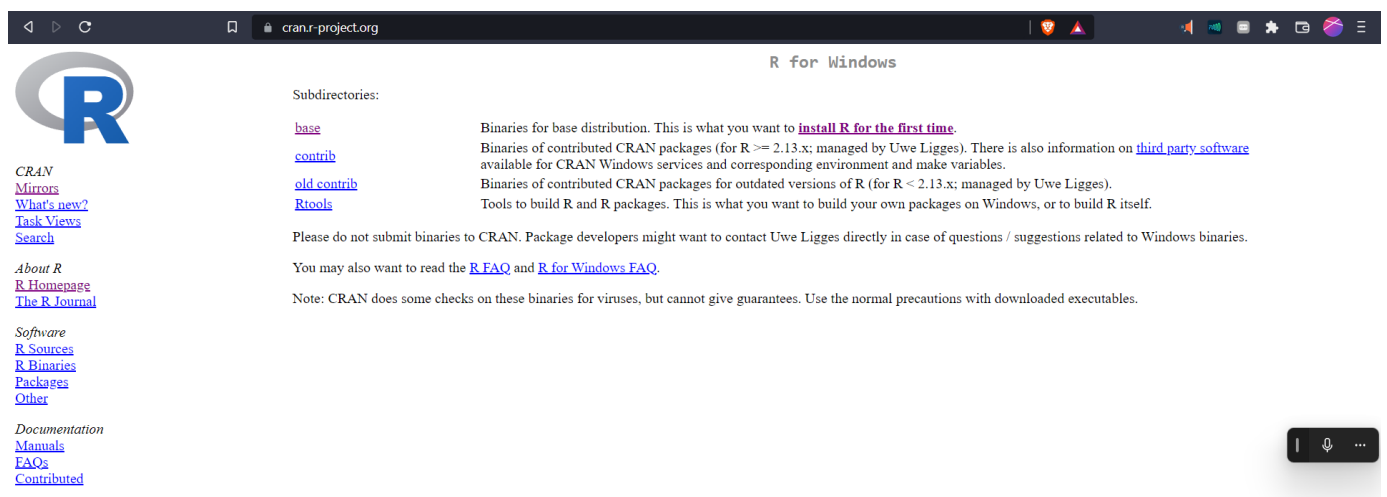
**Step – 1:** Go to CRAN R project website.



The screenshot shows the CRAN R project website. The main heading is "The Comprehensive R Archive Network". Below it, the "Download and Install R" section is highlighted. It states: "Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:" followed by a list of links: "Download R for Linux (Debian, Fedora/Redhat, Ubuntu)", "Download R for macOS", and "Download R for Windows". Below this, it says "R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above." The "Source Code for all Platforms" section follows, stating: "Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!" It then lists several bullet points: "The latest release (2021-11-01, Bird Hippie) [R-4.1.2.tar.gz](#), read [what's new](#) in the latest version.", "Sources of [R alpha and beta releases](#) (daily snapshots, created only in time periods before a planned release).", "Daily snapshots of current patched and development versions are [available here](#). Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.", "Source code of older versions of R is [available here](#).", and "Contributed extension [packages](#)". The "Questions About R" section at the bottom says: "If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email."

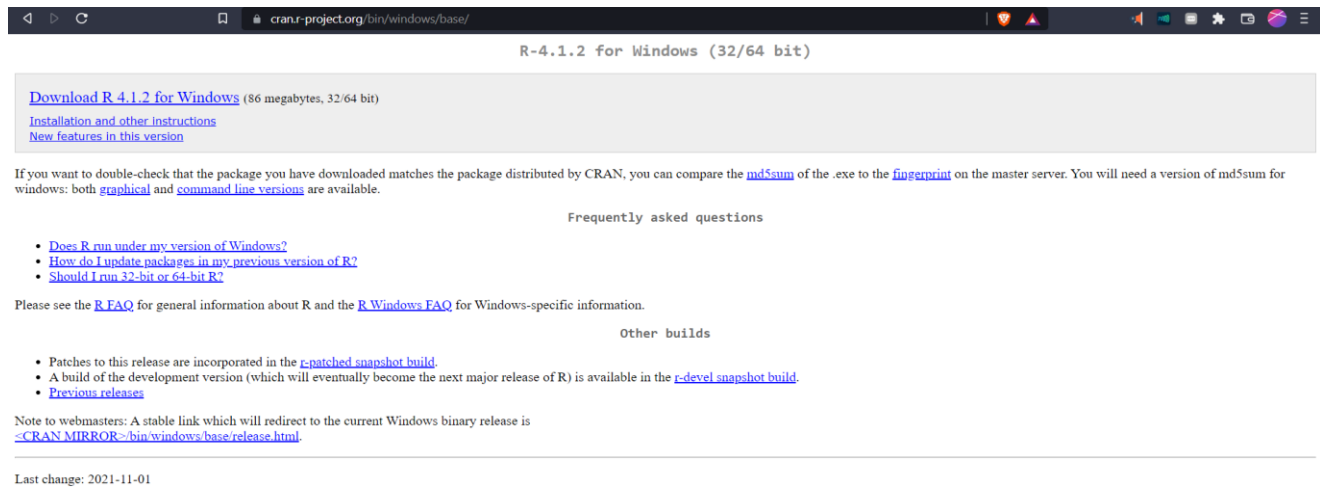
**Step – 2:** Click on the Download R for Windows link.

**Step – 3:** Click on the base subdirectory link or install R for the first time link.

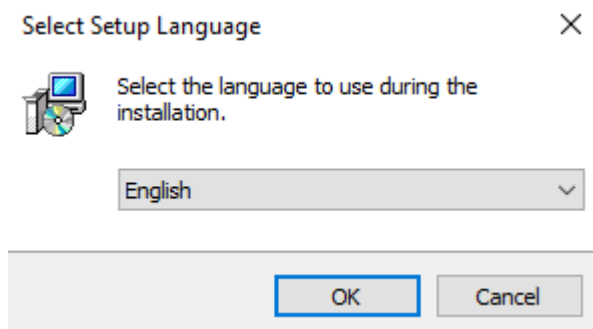


The screenshot shows the "R for Windows" subdirectory page on the CRAN R project website. The main heading is "R for Windows". Below it, the "Subdirectories:" section is highlighted. It lists four subdirectories: "base", "contrib", "old.contrib", and "Rtools". The "base" subdirectory is described as "Binaries for base distribution. This is what you want to [install R for the first time](#)." The "contrib" subdirectory is described as "Binaries of contributed CRAN packages (for R >= 2.13.x; managed by Uwe Ligges). There is also information on [third party software](#) available for CRAN Windows services and corresponding environment and make variables." The "old.contrib" subdirectory is described as "Binaries of contributed CRAN packages for outdated versions of R (for R < 2.13.x; managed by Uwe Ligges)." The "Rtools" subdirectory is described as "Tools to build R and R packages. This is what you want to build your own packages on Windows, or to build R itself." Below the subdirectories, it says: "Please do not submit binaries to CRAN. Package developers might want to contact Uwe Ligges directly in case of questions / suggestions related to Windows binaries." It also says: "You may also want to read the [R FAQ](#) and [R for Windows FAQ](#)." At the bottom, it says: "Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables."

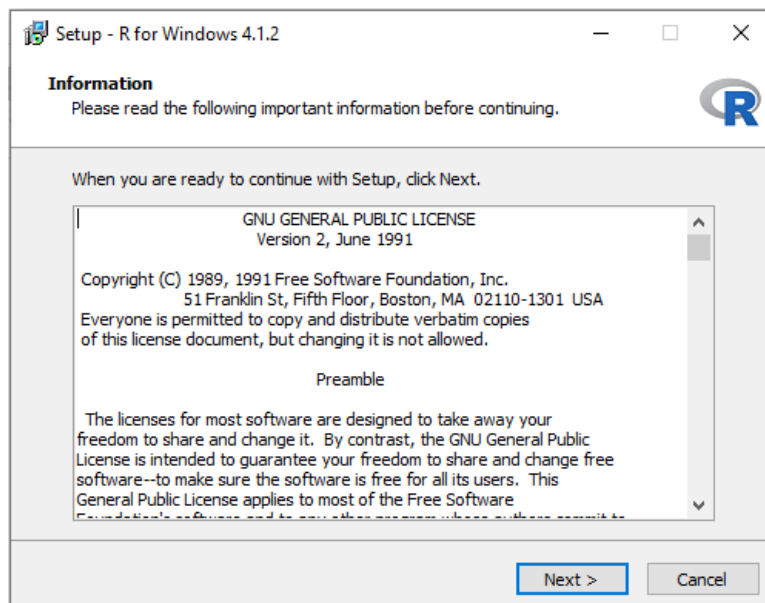
**Step – 4:** Click Download R X.X.X for Windows (X.X.X stand for the latest version of R. eg: 4.1.2) and save the executable .exe file.



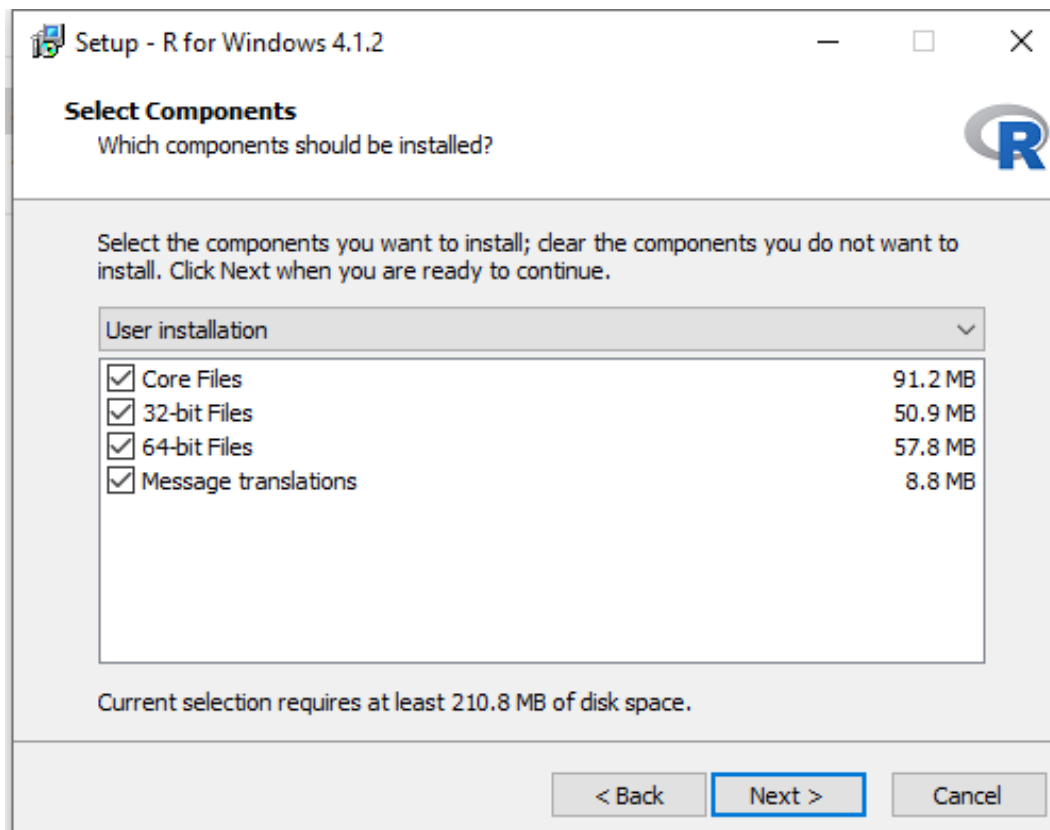
**Step – 5:** Run the .exe file and follow the installation instructions.



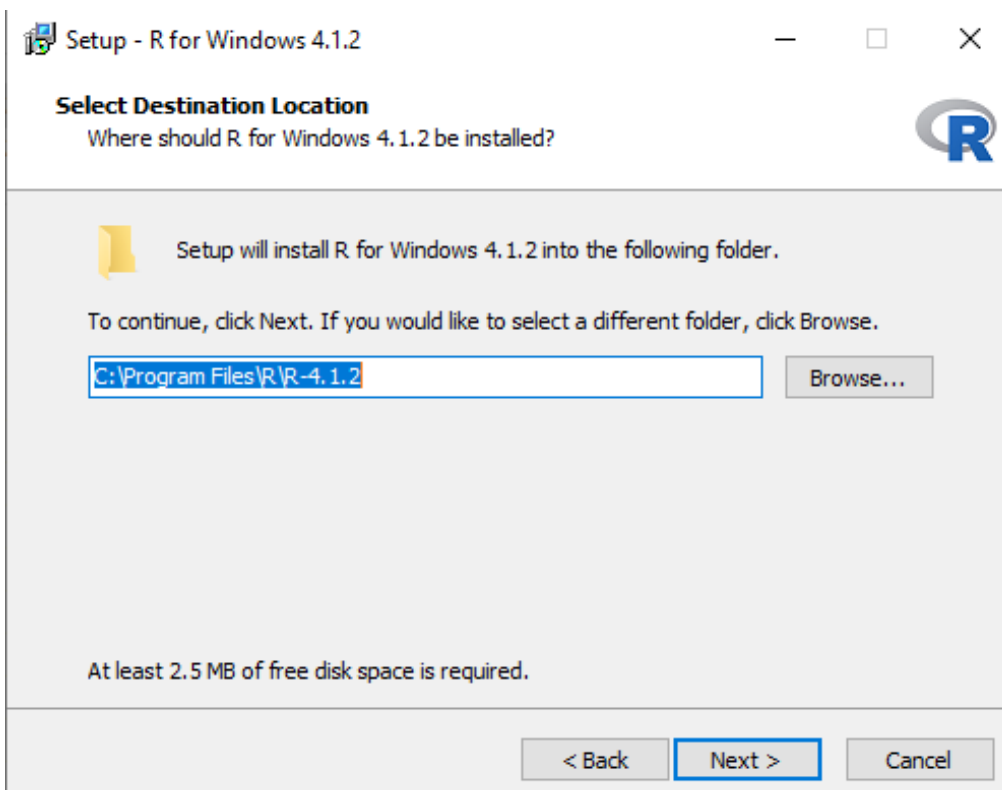
**5.b.** Read the license agreement and click Next.



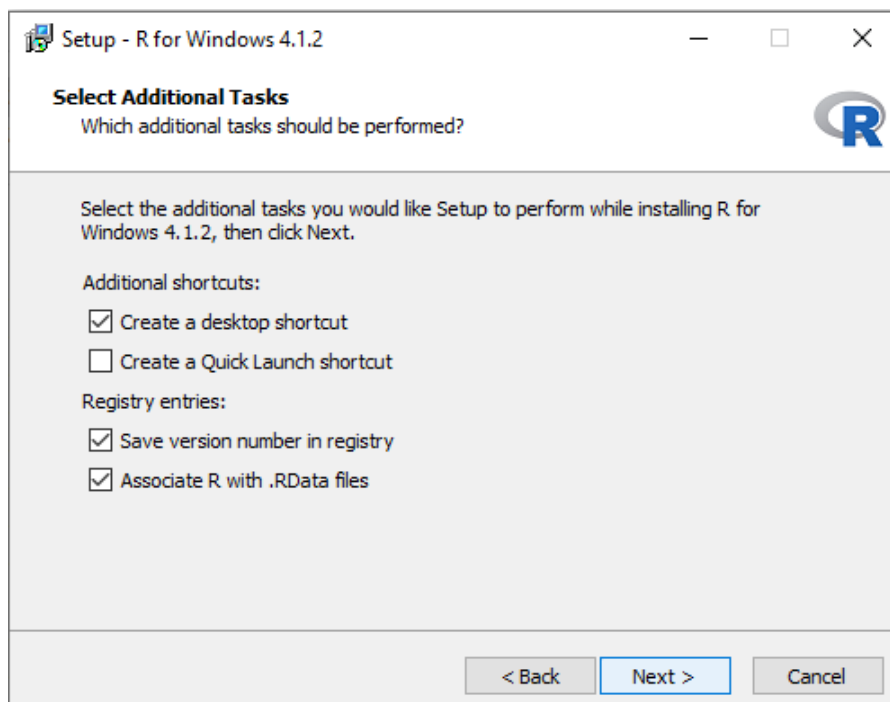
5.c. Select the components you wish to install (it is recommended to install all the components). Click Next.



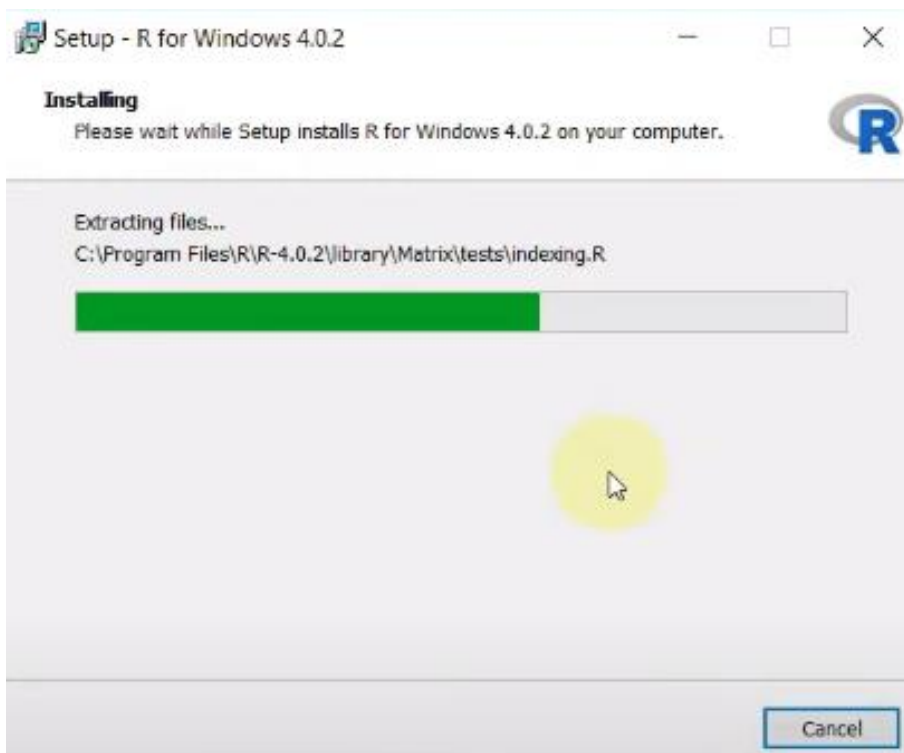
5.d. Enter/browse the folder/path you wish to install R into and then confirm by clicking Next.



5.e. Select additional tasks like creating desktop shortcuts etc. then click Next.



5.f. Wait for the installation process to complete.

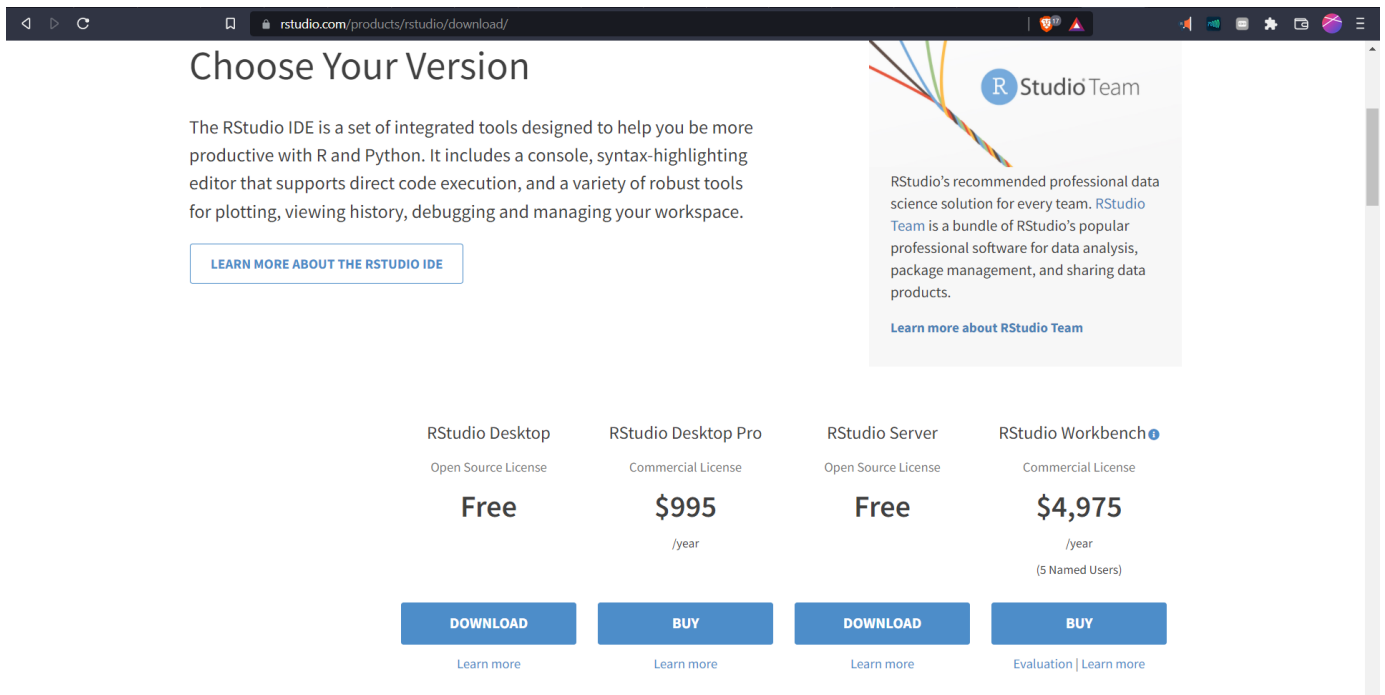


5.g. Click on Finish to complete the installation.



## Install RStudio on Windows

**Step – 1:** With R-base installed, let's move on to installing RStudio. To begin, go to download RStudio and click on the download button for RStudio desktop.

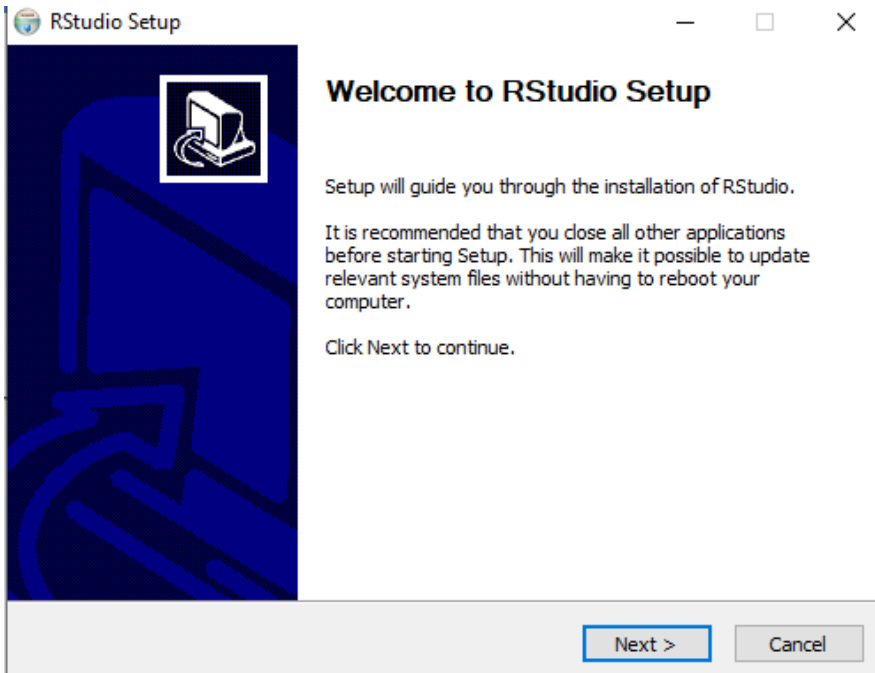


RStudio Desktop	RStudio Desktop Pro	RStudio Server	RStudio Workbench
Open Source License	Commercial License	Open Source License	Commercial License
Free	\$995/year	Free	\$4,975/year (5 Named Users)
<a href="#">DOWNLOAD</a>	<a href="#">BUY</a>	<a href="#">DOWNLOAD</a>	<a href="#">BUY</a>
<a href="#">Learn more</a>	<a href="#">Learn more</a>	<a href="#">Learn more</a>	<a href="#">Evaluation   Learn more</a>

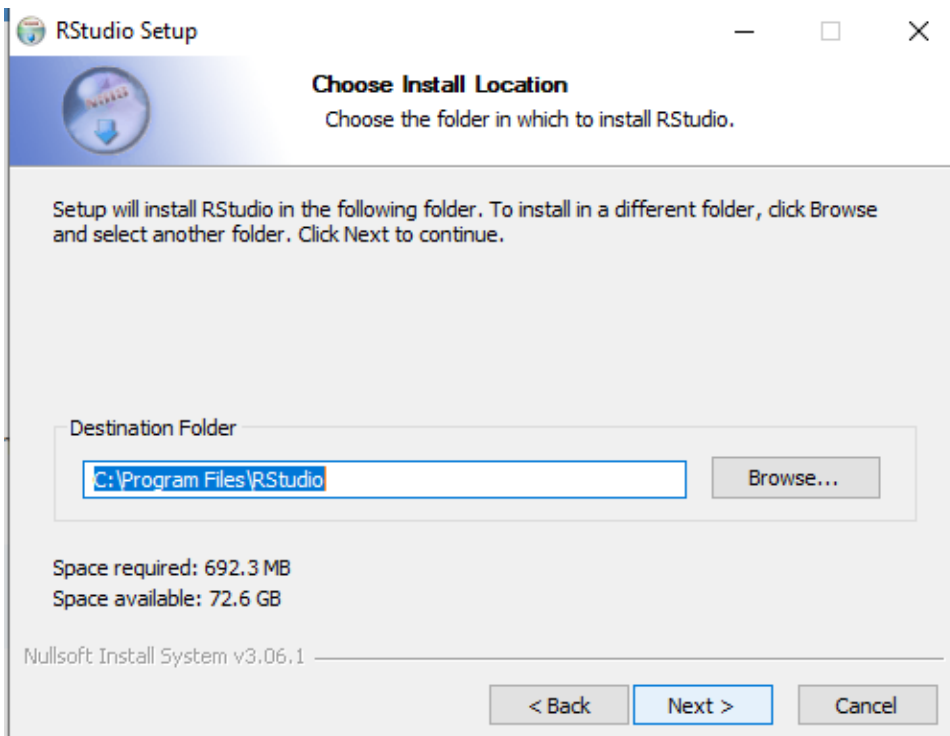
**Step – 2:** Click on the link for the windows version of RStudio and save the .exe file.

**Step – 3:** Run the .exe and follow the installation instructions.

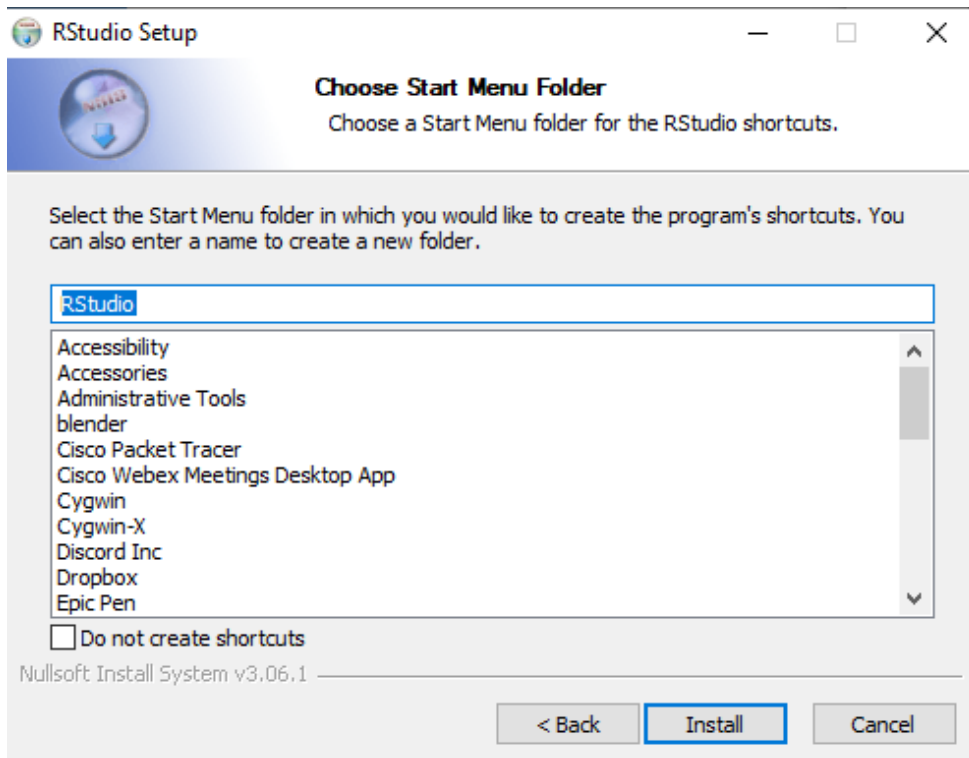
3.a. Click Next on the welcome window.



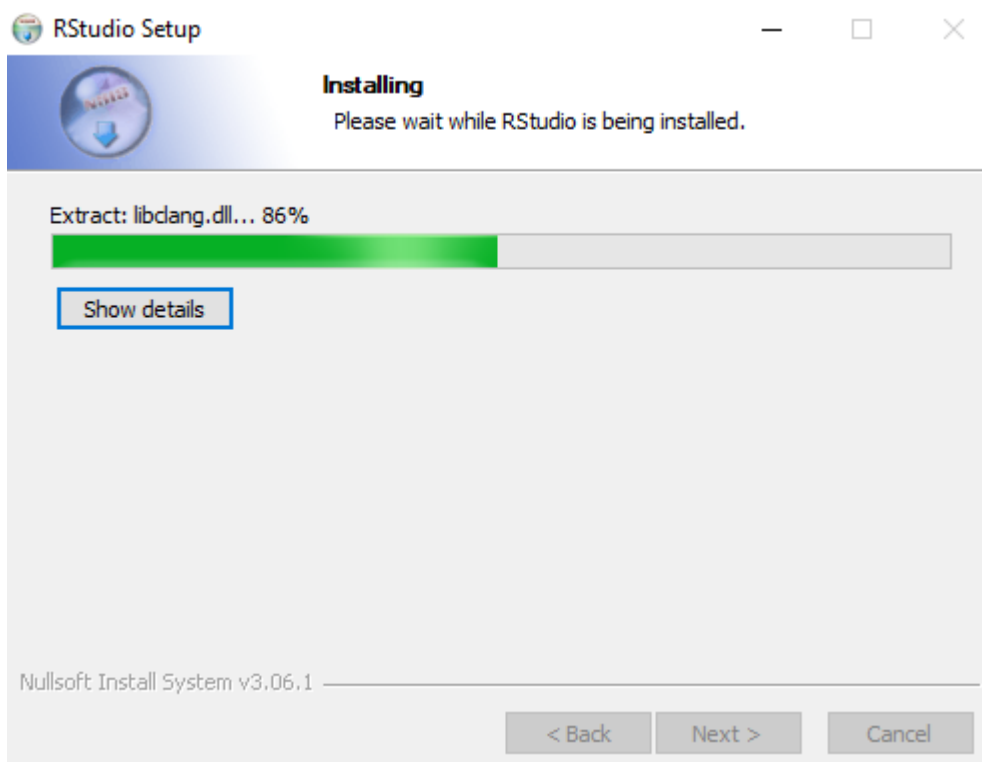
3.b. Enter/browse the path to the installation folder and click Next to proceed.



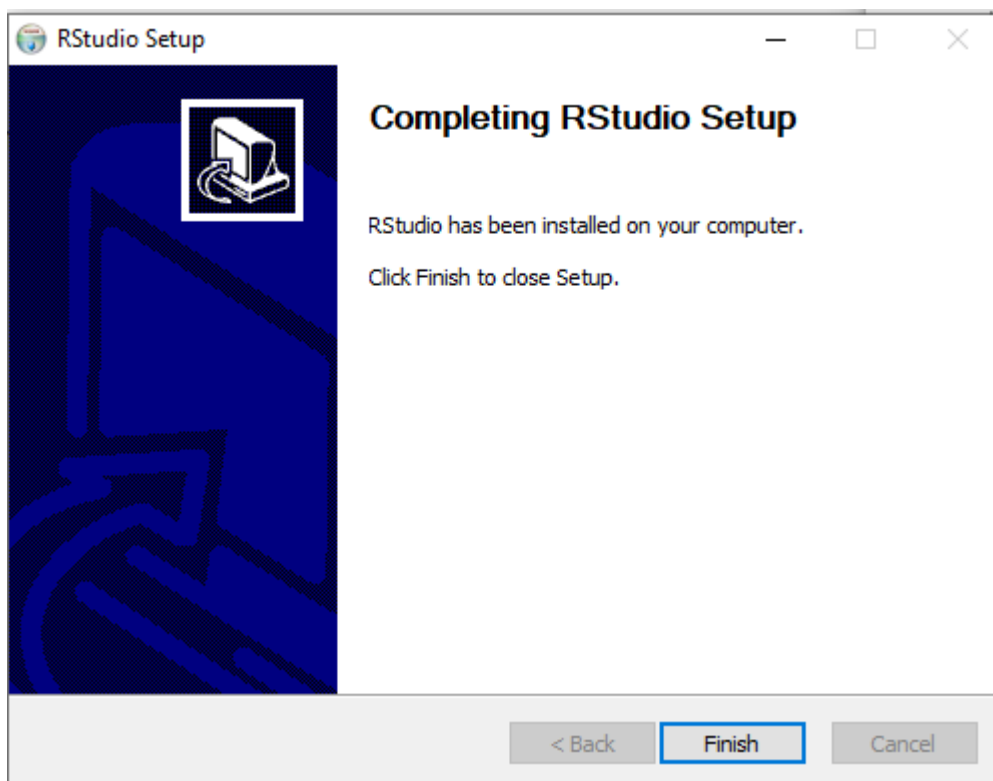
3.c. Select the folder for the start menu shortcut or click on do not create shortcuts and then click Next.



3.d. Wait for the installation process to complete.



3.e. Click Finish to end the installation.





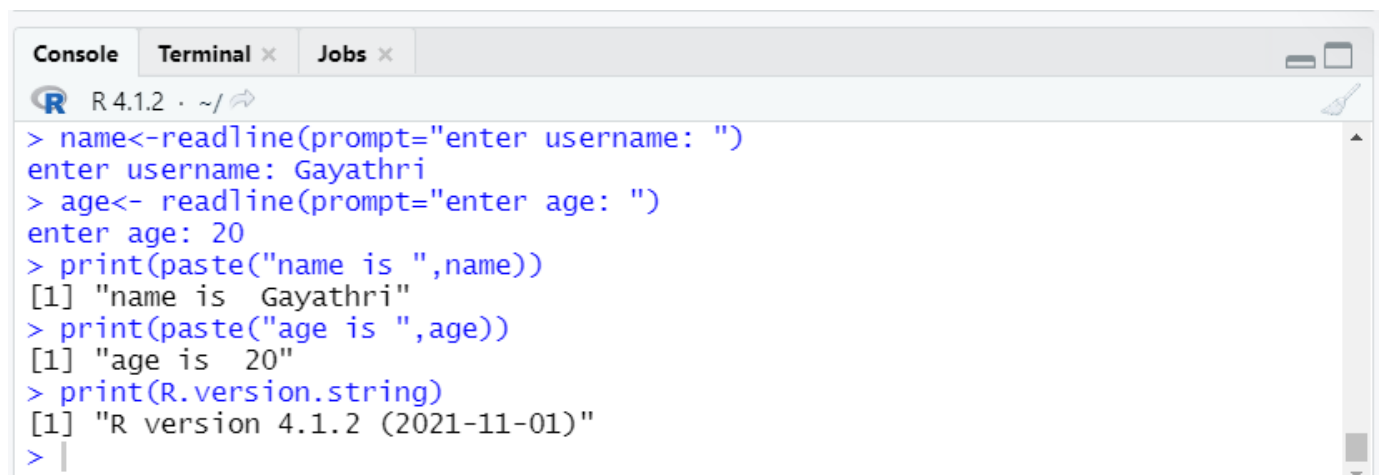
## Week-2

**AIM:** Write a R program to take input from the user (name and age) and display the values. Also print the version of R installation

**Code:**

```
name<-readline(prompt="enter username: ")
age<- readline(prompt="enter age: ")
print(paste("name is ",name))
print(paste("age is ",age))
```

**Output:**

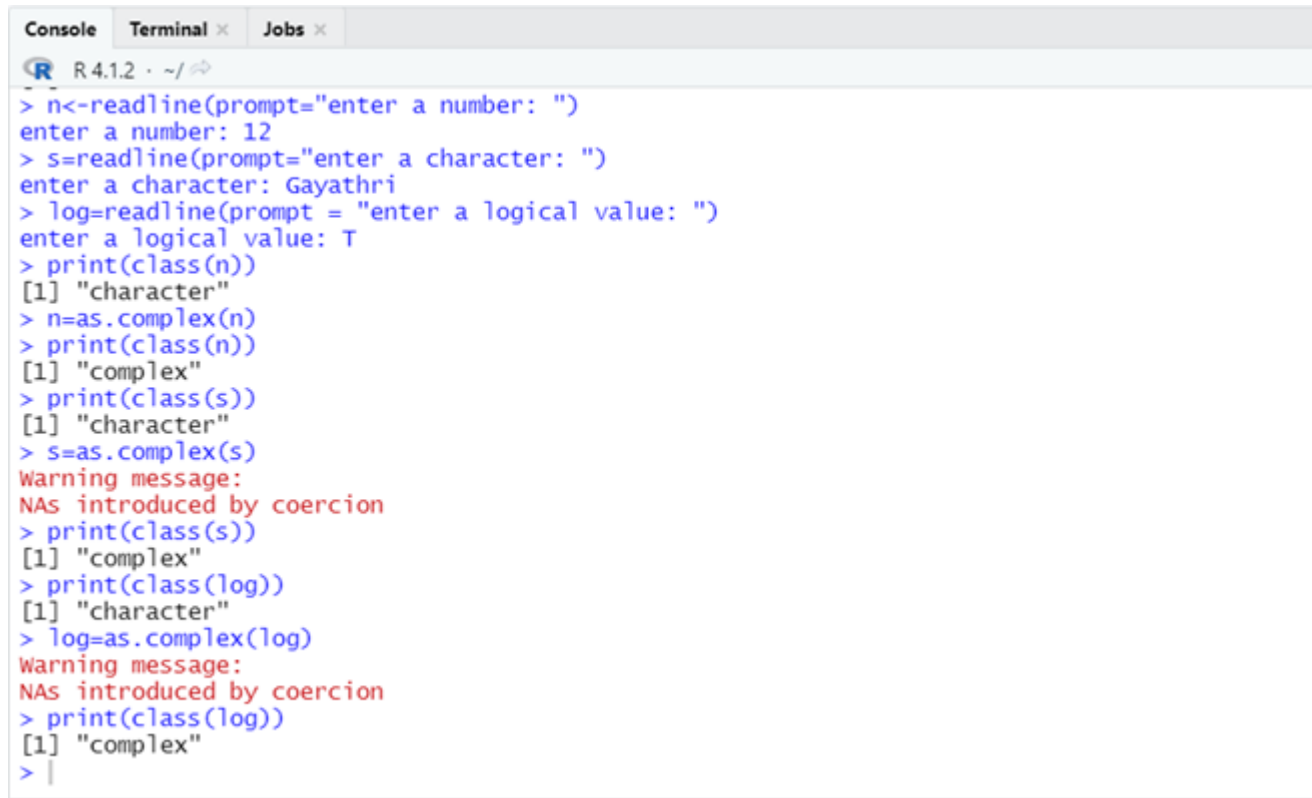


```
R 4.1.2 · ~/
> name<-readline(prompt="enter username: ")
enter username: Gayathri
> age<- readline(prompt="enter age: ")
enter age: 20
> print(paste("name is ",name))
[1] "name is  Gayathri"
> print(paste("age is ",age))
[1] "age is  20"
> print(R.version.string)
[1] "R version 4.1.2 (2021-11-01)"
> |
```

**AIM:** WARP to convert other types of object to complex type

**Code:**

```
n<-readline(prompt="enter a number: ")
s=readline(prompt="enter a character: ")
log=readline(prompt = "enter a logical value: ")
print(class(n))
n=as.complex(n)
print(class(n))
print(class(s))
s=as.complex(s)
print(class(s))
print(class(log))
log=as.complex(log)
print(class(log))
```

**Output:**

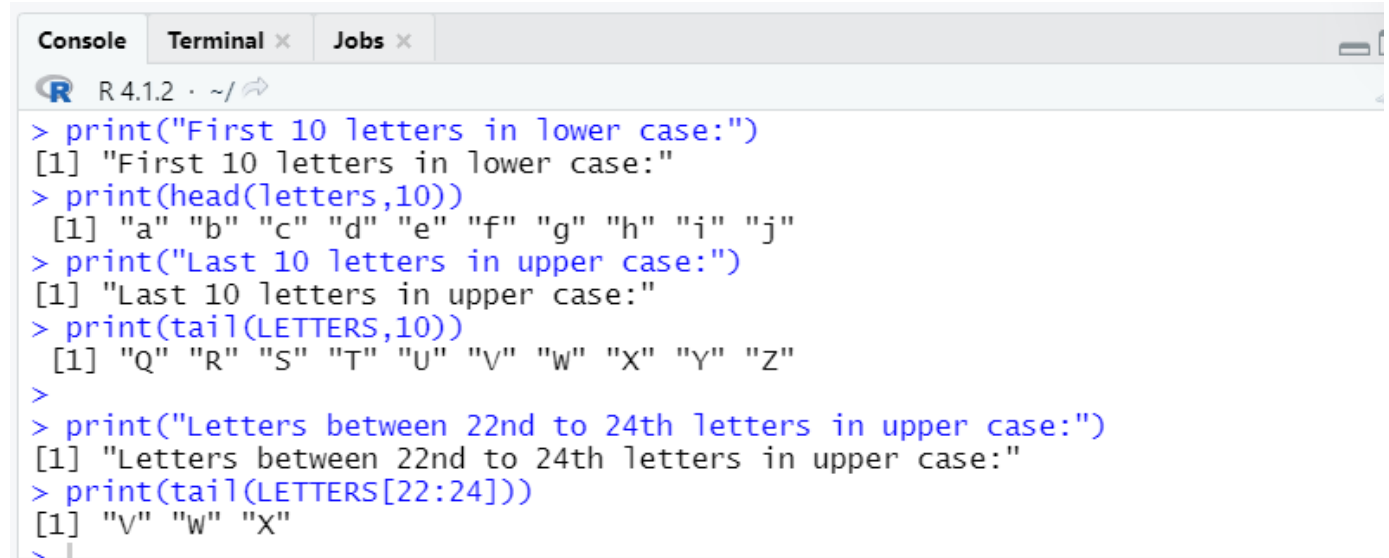
```
Console Terminal x Jobs x
R 4.1.2 · ~/
> n<-readline(prompt="enter a number: ")
enter a number: 12
> s=readline(prompt="enter a character: ")
enter a character: Gayathri
> log=readline(prompt = "enter a logical value: ")
enter a logical value: T
> print(class(n))
[1] "character"
> n=as.complex(n)
> print(class(n))
[1] "complex"
> print(class(s))
[1] "character"
> s=as.complex(s)
Warning message:
NAs introduced by coercion
> print(class(s))
[1] "complex"
> print(class(log))
[1] "character"
> log=as.complex(log)
Warning message:
NAs introduced by coercion
> print(class(log))
[1] "complex"
> |
```

**AIM:** Write a R program to extract the first 10 english letters in lowercase and last 10 letters in upper case and extract letters between 22<sup>nd</sup> to 24<sup>th</sup> letters in uppercase.

**Code:**

```
print("First 10 letters in lower case:")
print(head(letters,10))
print("Last 10 letters in upper case:")
print(tail(LETTERS,10))

print("Letters between 22nd to 24th letters in upper case:")
print(tail(LETTERS[22:24]))
```

**Output:**

```
Console Terminal x Jobs x
R 4.1.2 · ~/
> print("First 10 letters in lower case:")
[1] "First 10 letters in lower case:"
> print(head(letters,10))
[1] "a" "b" "c" "d" "e" "f" "g" "h" "i" "j"
> print("Last 10 letters in upper case:")
[1] "Last 10 letters in upper case:"
> print(tail(LETTERS,10))
[1] "Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z"
>
> print("Letters between 22nd to 24th letters in upper case:")
[1] "Letters between 22nd to 24th letters in upper case:"
> print(tail(LETTERS[22:24]))
[1] "V" "W" "X"
>
```

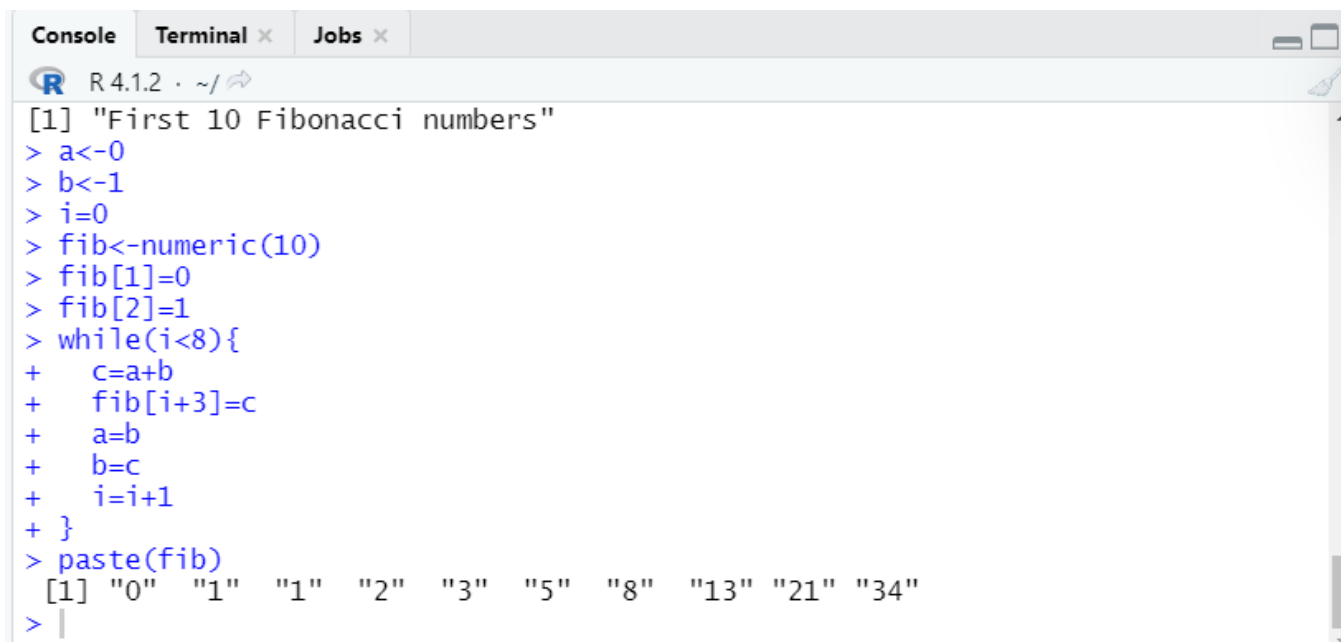
## Week-3

**AIM:** Write a R program to get the first 10 Fibonacci numbers

**Code:**

```
print("First 10 Fibonacci numbers")
a<-0
b<-1
i=0
fib<-numeric(10)
fib[1]=0
fib[2]=1
while(i<8){
  c=a+b
  fib[i+3]=c
  a=b
  b=c
  i=i+1
}
paste(fib)
```

**Output:**



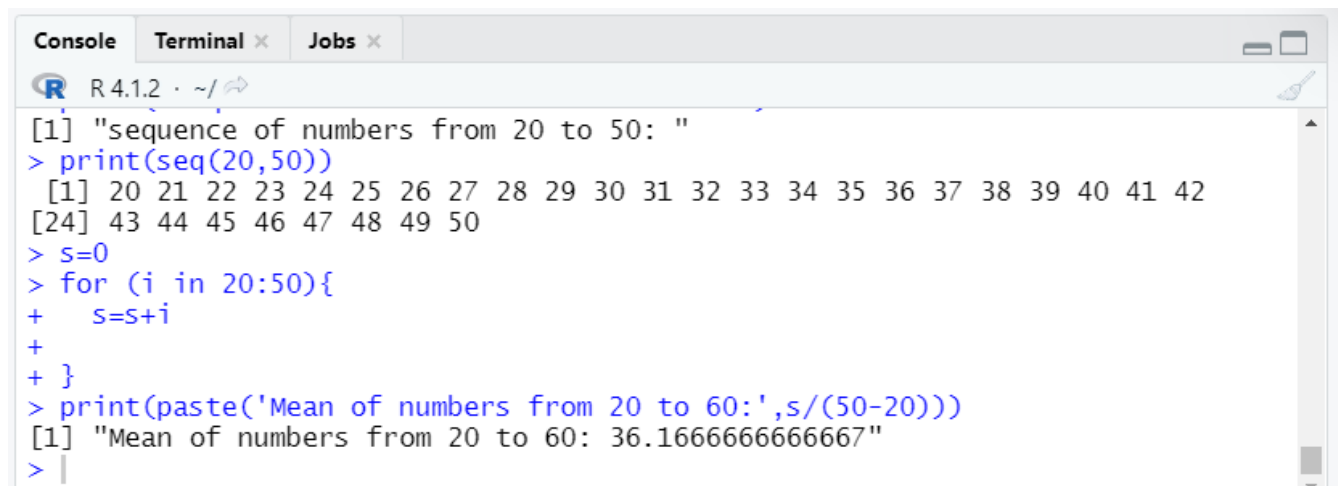
```
Console Terminal x Jobs x
R 4.1.2 · ~/
[1] "First 10 Fibonacci numbers"
> a<-0
> b<-1
> i=0
> fib<-numeric(10)
> fib[1]=0
> fib[2]=1
> while(i<8){
+   c=a+b
+   fib[i+3]=c
+   a=b
+   b=c
+   i=i+1
+ }
> paste(fib)
[1] "0" "1" "1" "2" "3" "5" "8" "13" "21" "34"
> |
```

**AIM:** Write a R program to create a sequence of numbers from 20 to 50 and find the mean of numbers

**Code:**

```
print('sequence of numbers from 20 to 50: ')\nprint(seq(20,50))\ns=0\nfor (i in 20:50){\n  s=s+i\n}\nprint(paste('Mean of numbers from 20 to 60:',s/(50-20)))
```

**Output:**



```
R 4.1.2 · ~/ \n[1] "sequence of numbers from 20 to 50: "\n> print(seq(20,50))\n [1] 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42\n[24] 43 44 45 46 47 48 49 50\n> s=0\n> for (i in 20:50){\n+   s=s+i\n+ }\n> print(paste('Mean of numbers from 20 to 60:',s/(50-20)))\n[1] "Mean of numbers from 20 to 60: 36.1666666666667"\n> |
```

**AIM:** Write a R program to print numbers from 1 to 100 and print “AAA” for multiples of 3, print “BBBBB” for multiples of 5 and print “AAABBBBB” for multiples of both.

**Code:**

```
for(i in 1:100){\n  if(i%%3==0 && i%%5==0){\n    print("AAABBBBB")\n  }\n  else if(i%%3==0){\n    print("AAA")\n  }\n  else if(i%%5==0){\n    print("BBBBB")\n  }\n  else{\n
```

```

    print(i)
  }
}

```

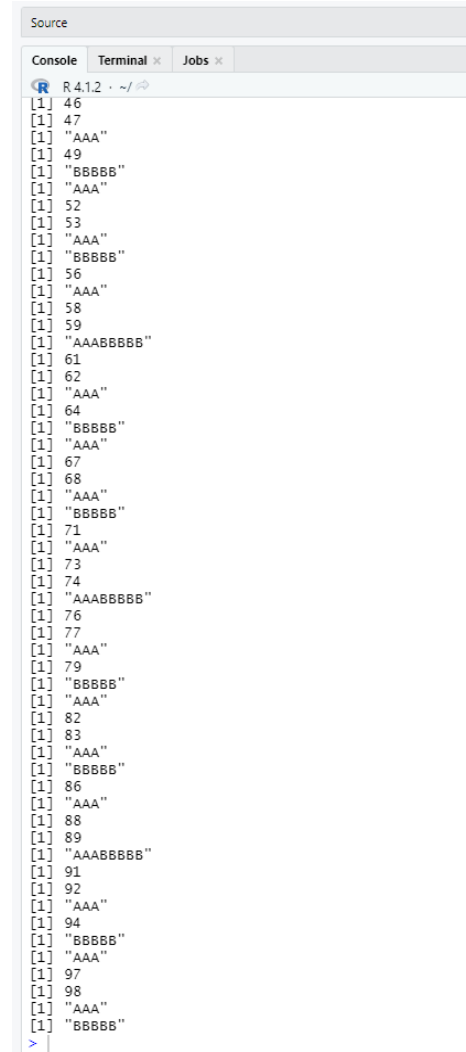
### Output:



```

Source
Console Terminal x Jobs x
R 4.1.2 ~ /
> for(i in 1:100){
+   if(i%3==0 && i%5==0){
+     print("AAABBBB")
+   }
+   else if(i%3==0){
+     print("AAA")
+   }
+   else if(i%5==0){
+     print("BBBBB")
+   }
+   else{
+     print(i)
+   }
+ }
+
[1] 1
[1] 2
[1] "AAA"
[1] 4
[1] "BBBBB"
[1] "AAA"
[1] 7
[1] 8
[1] "AAA"
[1] "BBBBB"
[1] 11
[1] "AAA"
[1] 13
[1] 14
[1] "AAABBBB"
[1] 16
[1] 17
[1] "AAA"
[1] 19
[1] "BBBBB"
[1] "AAA"
[1] 22
[1] 23
[1] "AAA"
[1] "BBBBB"
[1] 26
[1] "AAA"
[1] 28
[1] 29
[1] "AAABBBB"
[1] 31
[1] 32
[1] "AAA"
[1] 34
[1] "BBBBB"
[1] "AAA"
[1] 37
[1] 38
[1] "AAA"
[1] "BBBBB"

```



```

Source
Console Terminal x Jobs x
R 4.1.2 ~ /
[1] 46
[1] 47
[1] "AAA"
[1] 49
[1] "BBBBB"
[1] "AAA"
[1] 52
[1] 53
[1] "AAA"
[1] "BBBBB"
[1] 56
[1] "AAA"
[1] 58
[1] 59
[1] "AAABBBB"
[1] 61
[1] 62
[1] "AAA"
[1] 64
[1] "BBBBB"
[1] "AAA"
[1] 67
[1] 68
[1] "AAA"
[1] "BBBBB"
[1] 71
[1] "AAA"
[1] 73
[1] 74
[1] "AAABBBB"
[1] 76
[1] 77
[1] "AAA"
[1] 79
[1] "BBBBB"
[1] "AAA"
[1] 82
[1] 83
[1] "AAA"
[1] "BBBBB"
[1] 86
[1] "AAA"
[1] 88
[1] 89
[1] "AAABBBB"
[1] 91
[1] 92
[1] "AAA"
[1] 94
[1] "BBBBB"
[1] "AAA"
[1] 97
[1] 98
[1] "AAA"
[1] "BBBBB"
>

```

**AIM:** Write a R program to find the list of even numbers from 1 to n.

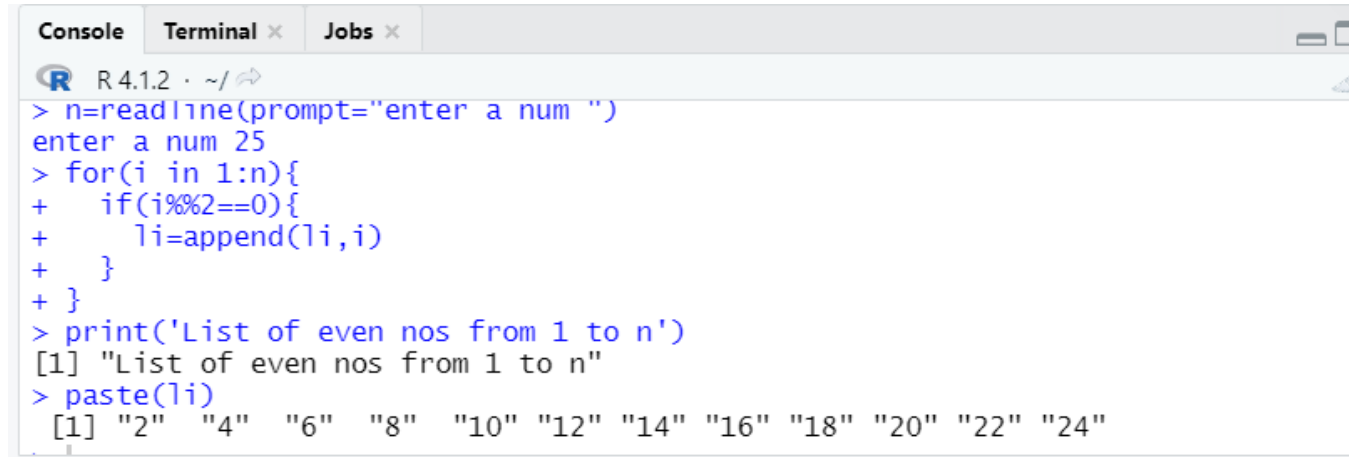
### Code:

```

li=list()
n=readline(prompt="enter a num ")
for(i in 1:n){
  if(i%2==0){
    li=append(li,i)
  }
}
print('List of even nos from 1 to n')

```

```
paste(li)
```

**Output:**

```
R 4.1.2 · ~/
> n=readline(prompt="enter a num ")
enter a num 25
> for(i in 1:n){
+   if(i%%2==0){
+     li=append(li,i)
+   }
+ }
> print('List of even nos from 1 to n')
[1] "List of even nos from 1 to n"
> paste(li)
[1] "2" "4" "6" "8" "10" "12" "14" "16" "18" "20" "22" "24"
```

**AIM:** Write a R program to get all prime numbers up to a given number

**Code**

```
print('prime numbers up to a given number,n')
n=readline(prompt = "enter a num ")
for(i in 2:n){
  c=0
  for(j in 3:i-1){
    #print(j)
    #print(paste(i,i%%j,j))
    if(i%%j==0){
      c=c+1
      #print(c)
      break
    }
  }
  if(c==0){
    print(i)
  }
}
```

**Output:**

```
> print('prime numbers up to a given number,n')
[1] "prime numbers up to a given number,n"
> n=readline(prompt = "enter a num ")
enter a num 30
> for(i in 2:n){
+   c=0
+   for(j in 3:i-1){
+     #print(j)
+     #print(paste(i,i%%j,j))
+     if(i%%j==0){
+       c=c+1
+       #print(c)
+       break
+     }
+   }
+   if(c==0){
+     print(i)
+   }
+ }
[1] 3
[1] 5
[1] 7
[1] 11
[1] 13
[1] 17
[1] 19
[1] 23
[1] 29
> |
```