

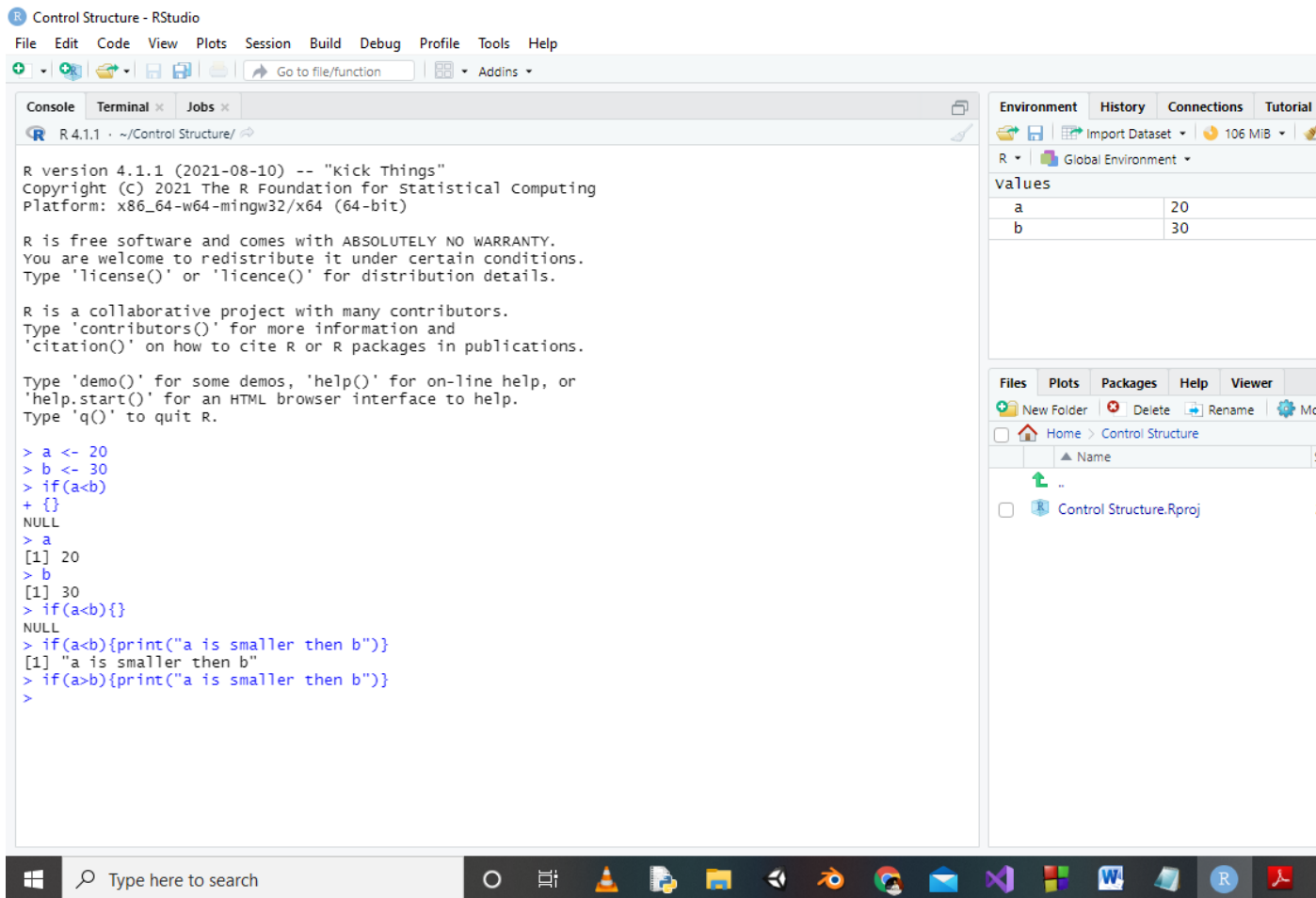
Set B

Q: Make a tutorial presentation/documentation on, R control Structure: If else, while, for loops, functions. Write programming example for each of them. (Use Screenshots of full screen for each step, so that it can be differentiated from other person.

R Control Structure

There are a few control structures in R that help to control the flow of the program. In R, there are decision-making structures like if-else that control execution of the program conditionally.

- 1. If Statement:-** If statement will be executed if the condition inside the if statement is true. For Example:-



The screenshot shows the RStudio interface. The console displays the R version 4.1.1 (2021-08-10) and the execution of an R script. The script defines variables 'a' and 'b', and uses an if-else statement to print a message based on their values.

```
R version 4.1.1 (2021-08-10) -- "kick Things"
Copyright (C) 2021 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> a <- 20
> b <- 30
> if(a<b)
+ {}
NULL
> a
[1] 20
> b
[1] 30
> if(a<b){}
NULL
> if(a<b){print("a is smaller then b")}
[1] "a is smaller then b"
> if(a>b){print("a is smaller then b")}
>
```

The Environment pane on the right shows the Global Environment with variables 'a' and 'b' having values 20 and 30 respectively.

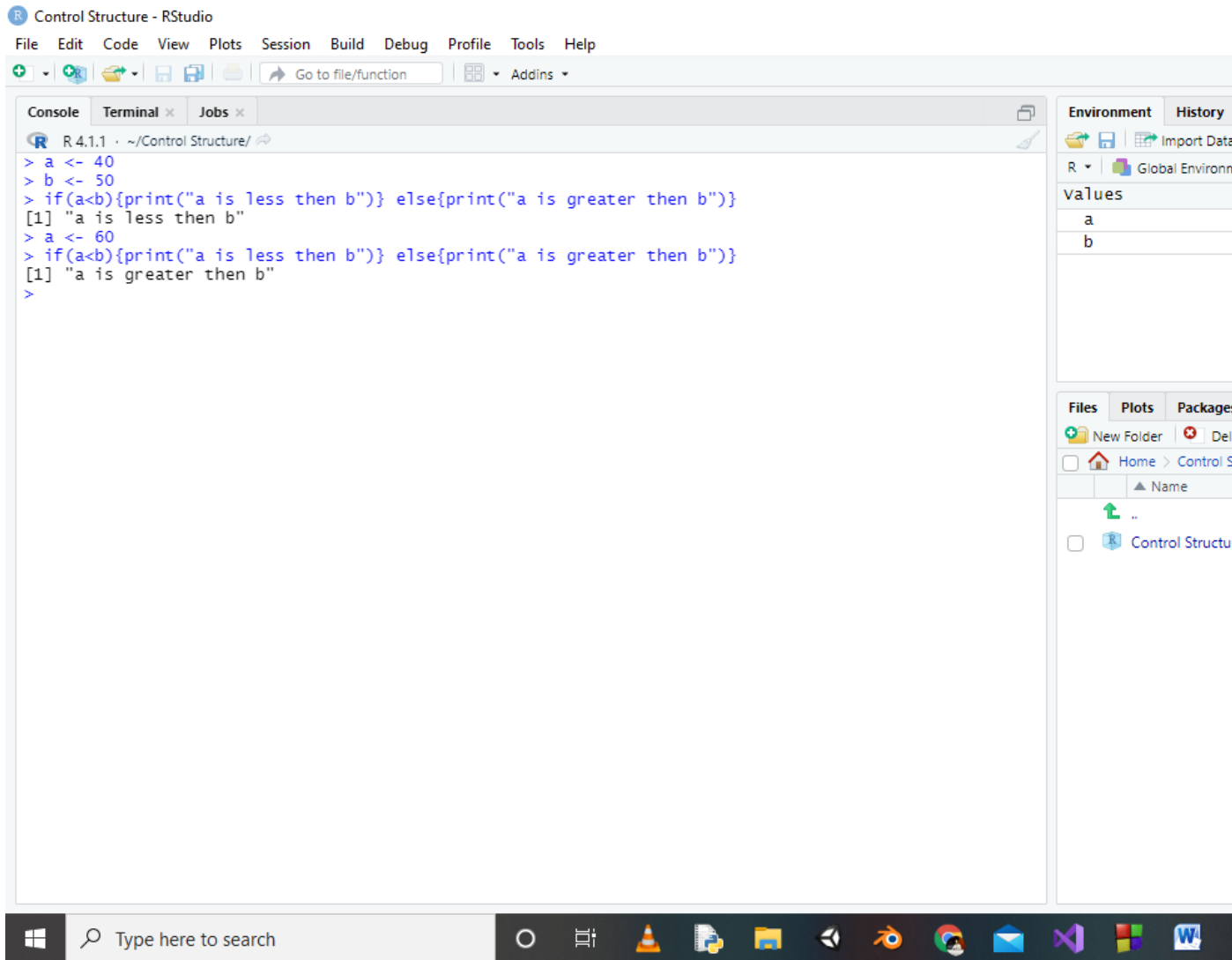
Name: Ajya Kumar Mishra

Registration number:12020608

Roll number:A28

Assignment 1 for CAP 788

2. If Else Statement:- If the condition given in if statement is true then if statement will be executed else the else part will be executed. For Example:-



The screenshot shows the RStudio interface with the following content:

Console:

```
R 4.1.1 ~./Control Structure/
> a <- 40
> b <- 50
> if(a<b){print("a is less then b")} else{print("a is greater then b")}
[1] "a is less then b"
> a <- 60
> if(a<b){print("a is less then b")} else{print("a is greater then b")}
[1] "a is greater then b"
>
```

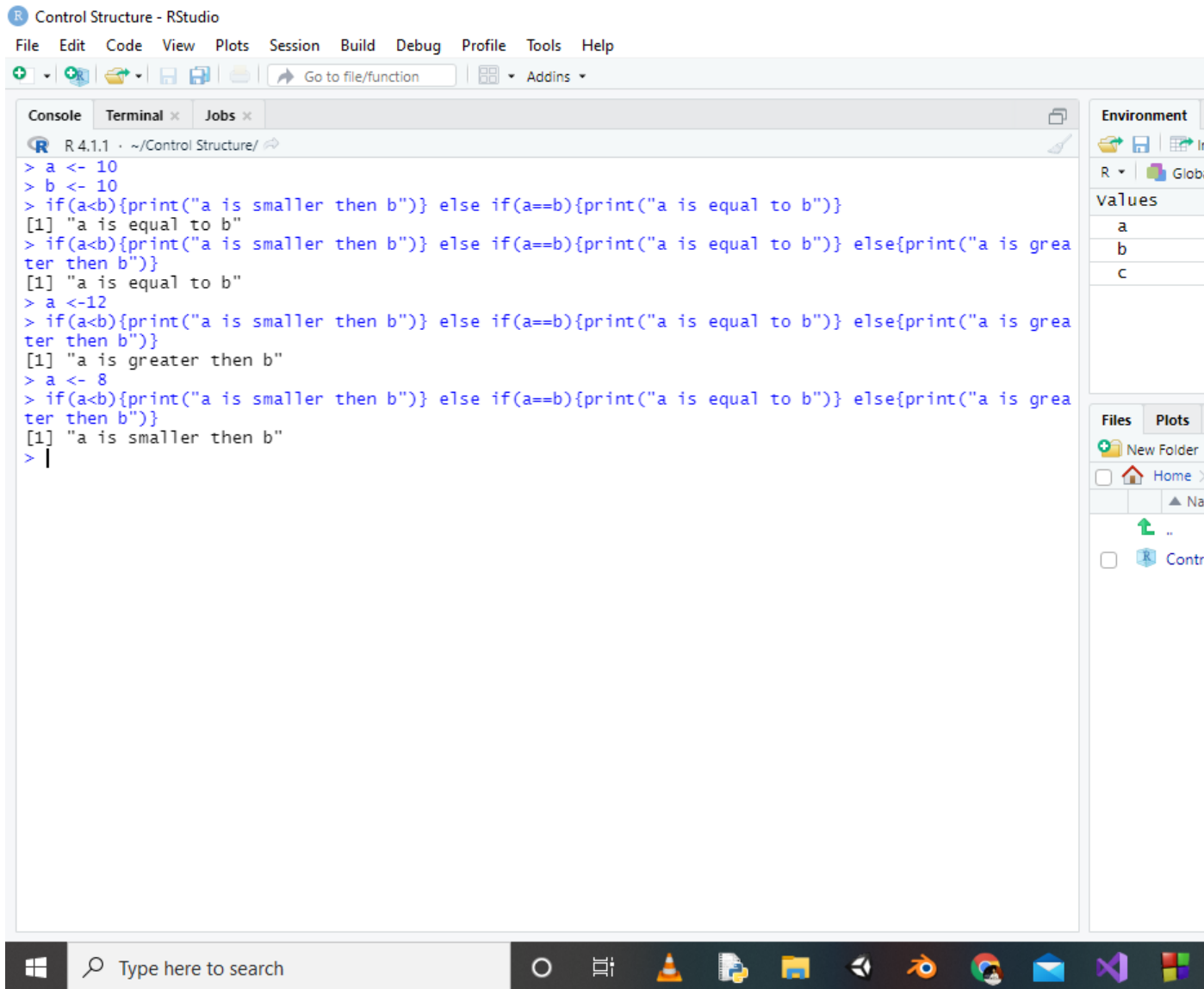
Environment:

Values
a
b

Files:

- Home > Control S
- Control Stru

3. If Else Ladder:- If condition is more , then we can use if else ladder as shown in figure.



The screenshot shows the RStudio interface with the following content:

Console:

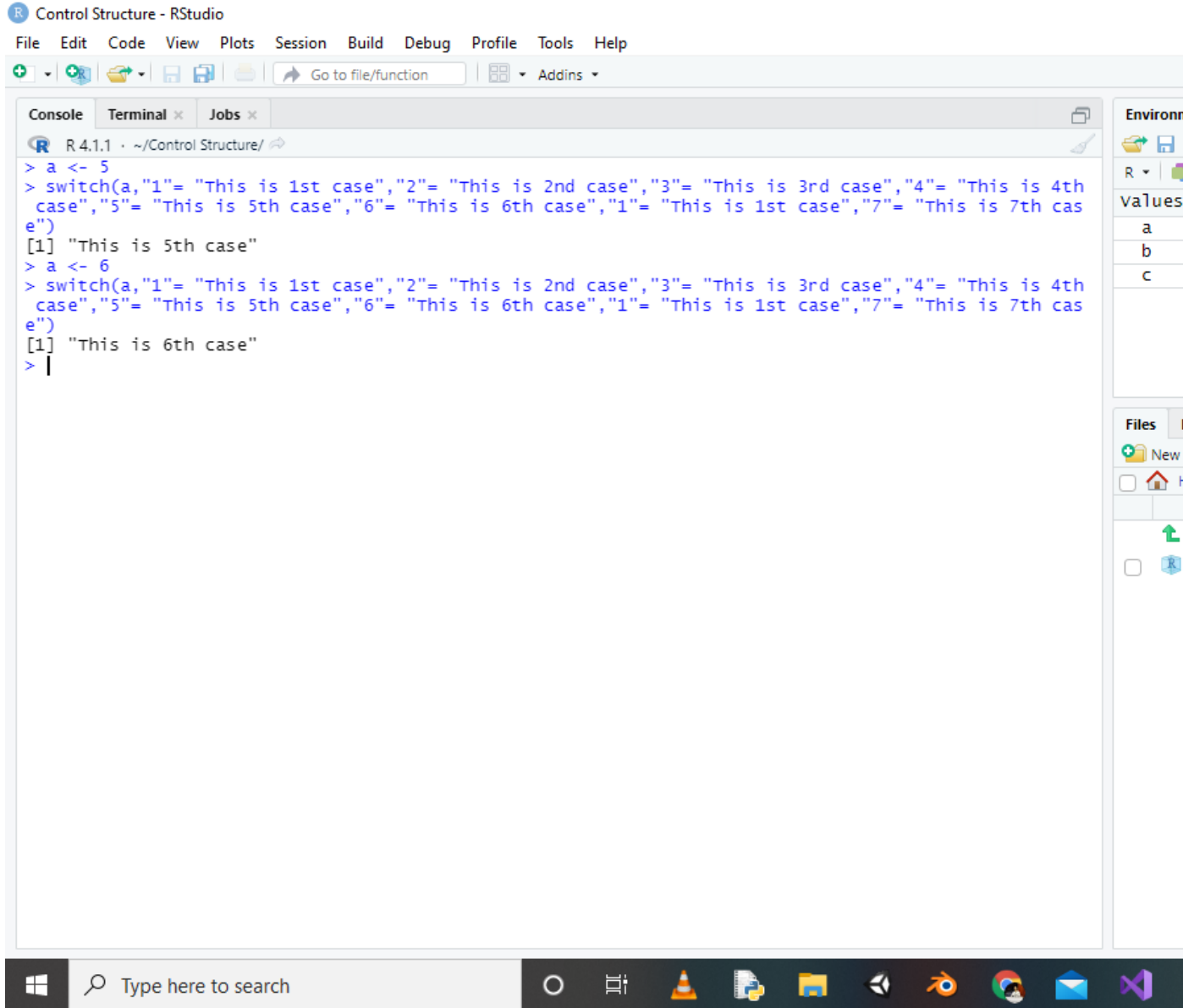
```
R 4.1.1 · ~/Control Structure/  
> a <- 10  
> b <- 10  
> if(a<b){print("a is smaller then b")} else if(a==b){print("a is equal to b")}  
[1] "a is equal to b"  
> if(a<b){print("a is smaller then b")} else if(a==b){print("a is equal to b")} else{print("a is greater then b")}  
[1] "a is equal to b"  
> a <-12  
> if(a<b){print("a is smaller then b")} else if(a==b){print("a is equal to b")} else{print("a is greater then b")}  
[1] "a is greater then b"  
> a <- 8  
> if(a<b){print("a is smaller then b")} else if(a==b){print("a is equal to b")} else{print("a is greater then b")}  
[1] "a is smaller then b"  
> |
```

Environment:

Values
a
b
c

The Windows taskbar at the bottom shows the Start button, a search bar, and several application icons including VLC, File Explorer, and RStudio.

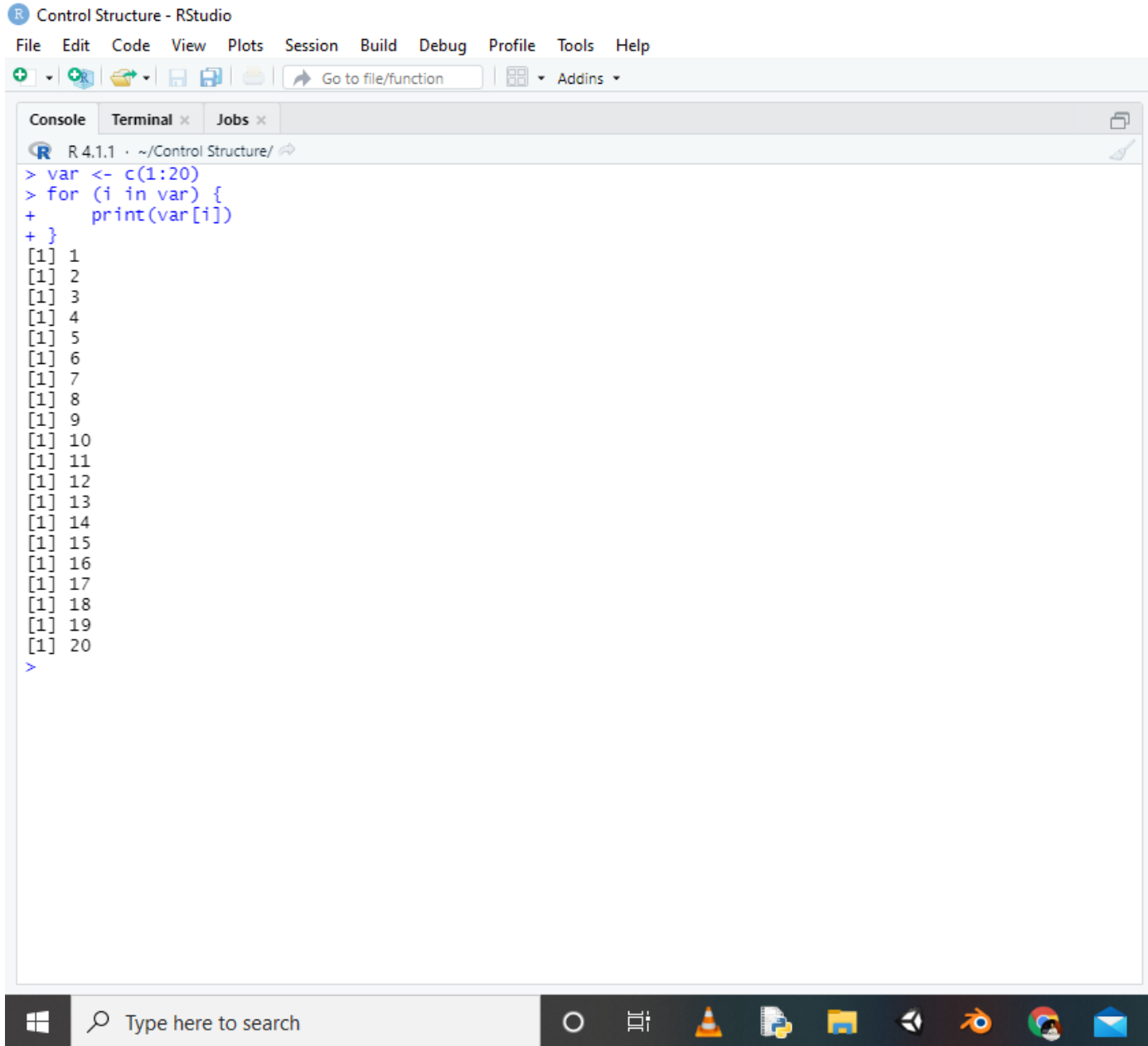
4. Switch Statement:- It is used when we have multiple alternatives. For Example :-



The screenshot shows the RStudio interface with the Console pane active. The R version is 4.1.1. The code in the console demonstrates a switch statement. First, a variable 'a' is assigned the value 5. Then, a switch statement is executed with 'a' as the expression. The cases are: "1" = "This is 1st case", "2" = "This is 2nd case", "3" = "This is 3rd case", "4" = "This is 4th case", "5" = "This is 5th case", "6" = "This is 6th case", "1" = "This is 1st case", and "7" = "This is 7th case". The output shows "[1] 'This is 5th case'". Then, 'a' is assigned the value 6, and the switch statement is executed again. The output shows "[1] 'This is 6th case'". The Environment pane on the right shows the variable 'a' with values 'a', 'b', and 'c'. The Files pane shows a 'New' button and a home icon. The Windows taskbar at the bottom shows the search bar and various application icons.

```
R 4.1.1 · ~/Control Structure/  
> a <- 5  
> switch(a,"1"= "This is 1st case","2"= "This is 2nd case","3"= "This is 3rd case","4"= "This is 4th  
case","5"= "This is 5th case","6"= "This is 6th case","1"= "This is 1st case","7"= "This is 7th cas  
e")  
[1] "This is 5th case"  
> a <- 6  
> switch(a,"1"= "This is 1st case","2"= "This is 2nd case","3"= "This is 3rd case","4"= "This is 4th  
case","5"= "This is 5th case","6"= "This is 6th case","1"= "This is 1st case","7"= "This is 7th cas  
e")  
[1] "This is 6th case"  
> |
```

5. For Loop:- The for loop in R, repeats through sequences to perform repeated tasks. They work with an iterable variable to go through a sequence. The following is the syntax of for loops in R: For Example:-



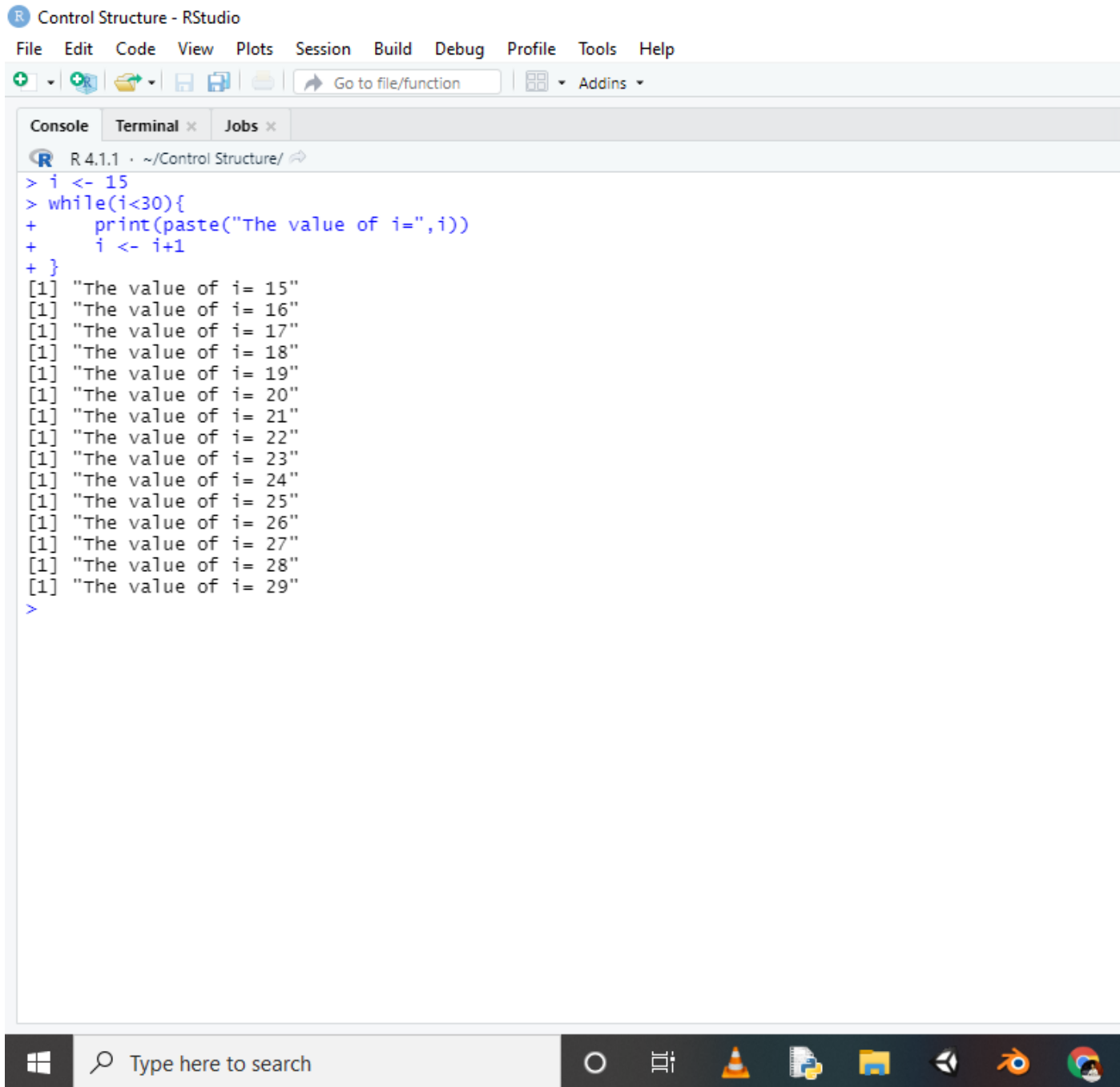
The screenshot shows the RStudio interface with the following components:

- Menu Bar:** File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, Help.
- Toolbar:** Includes icons for saving, opening, and navigating files, along with a "Go to file/function" search bar.
- Console:** Displays the execution of an R script. The code entered is:

```
> var <- c(1:20)
> for (i in var) {
+   print(var[i])
+ }
```

The output shows the values 1 through 20, each preceded by "[1]".
- Terminal:** Currently empty.
- Jobs:** Currently empty.
- Taskbar:** At the bottom of the screen, showing the Windows Start button, a search bar, and several application icons including VLC, a file explorer, and a web browser.

6. While Loop:- The while loop in R evaluates a condition. If the condition evaluates to TRUE it loops through a code block, whereas if the condition evaluates to FALSE it exits the loop. For Example:-

The image is a screenshot of the RStudio application window. The title bar reads "Control Structure - RStudio". The menu bar includes "File", "Edit", "Code", "View", "Plots", "Session", "Build", "Debug", "Profile", "Tools", and "Help". Below the menu bar is a toolbar with icons for file operations and a search bar labeled "Go to file/function". The main window is divided into three panes: "Console", "Terminal", and "Jobs". The "Console" pane is active and shows the following R code and its output:

```
> i <- 15
> while(i<30){
+   print(paste("The value of i=",i))
+   i <- i+1
+ }
```

```
[1] "The value of i= 15"
[1] "The value of i= 16"
[1] "The value of i= 17"
[1] "The value of i= 18"
[1] "The value of i= 19"
[1] "The value of i= 20"
[1] "The value of i= 21"
[1] "The value of i= 22"
[1] "The value of i= 23"
[1] "The value of i= 24"
[1] "The value of i= 25"
[1] "The value of i= 26"
[1] "The value of i= 27"
[1] "The value of i= 28"
[1] "The value of i= 29"
>
```

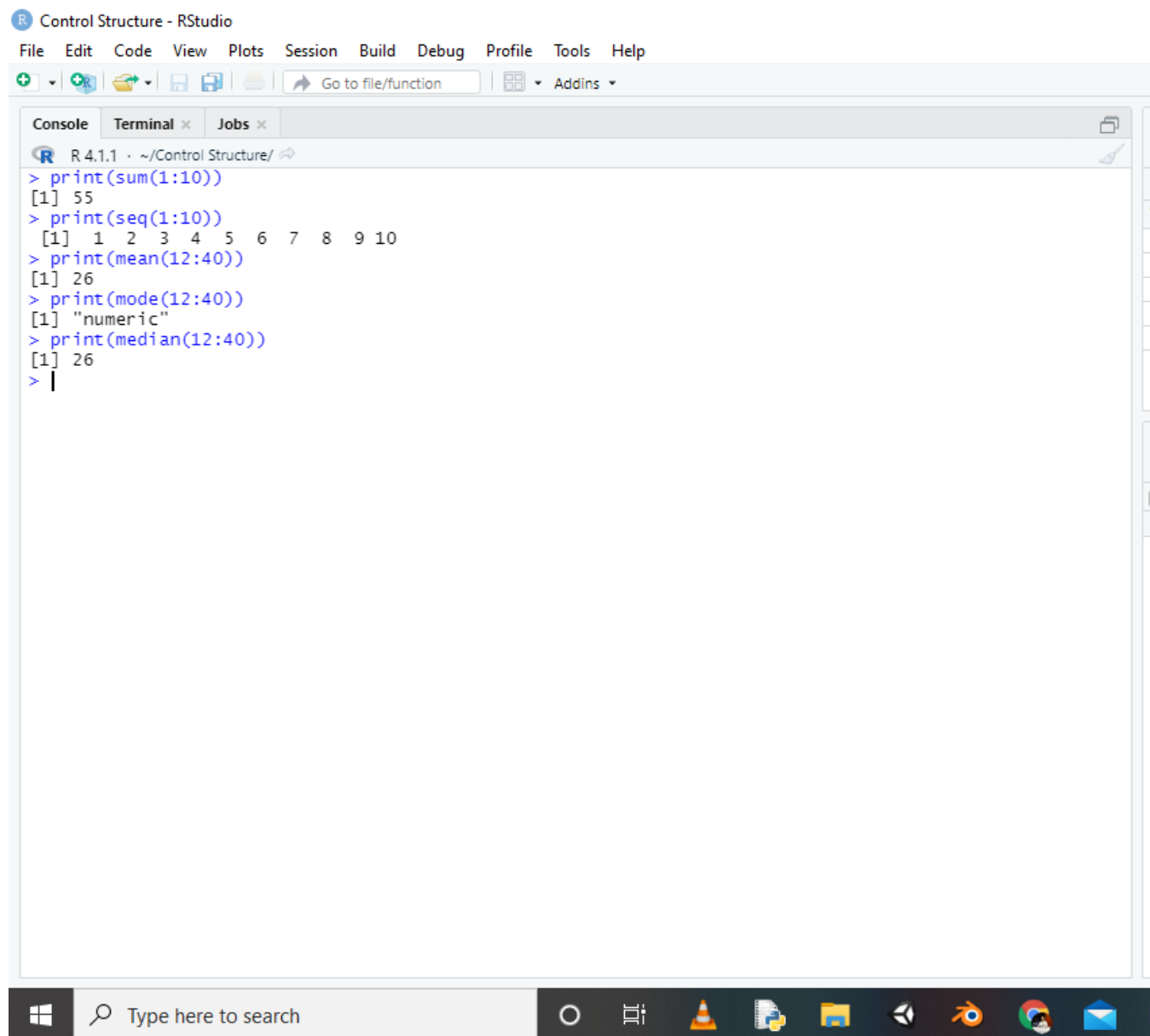
The bottom of the image shows the Windows taskbar with the search bar and several application icons.

7. Functions :- A function, in a programming environment, is a set of instructions. A programmer builds a function to avoid repeating the same task, or reduce complexity.

Syntax

```
function_name <- function(arg_1, arg_2, ...) {  
  Function body  
}
```

Example of Built in Functions:-

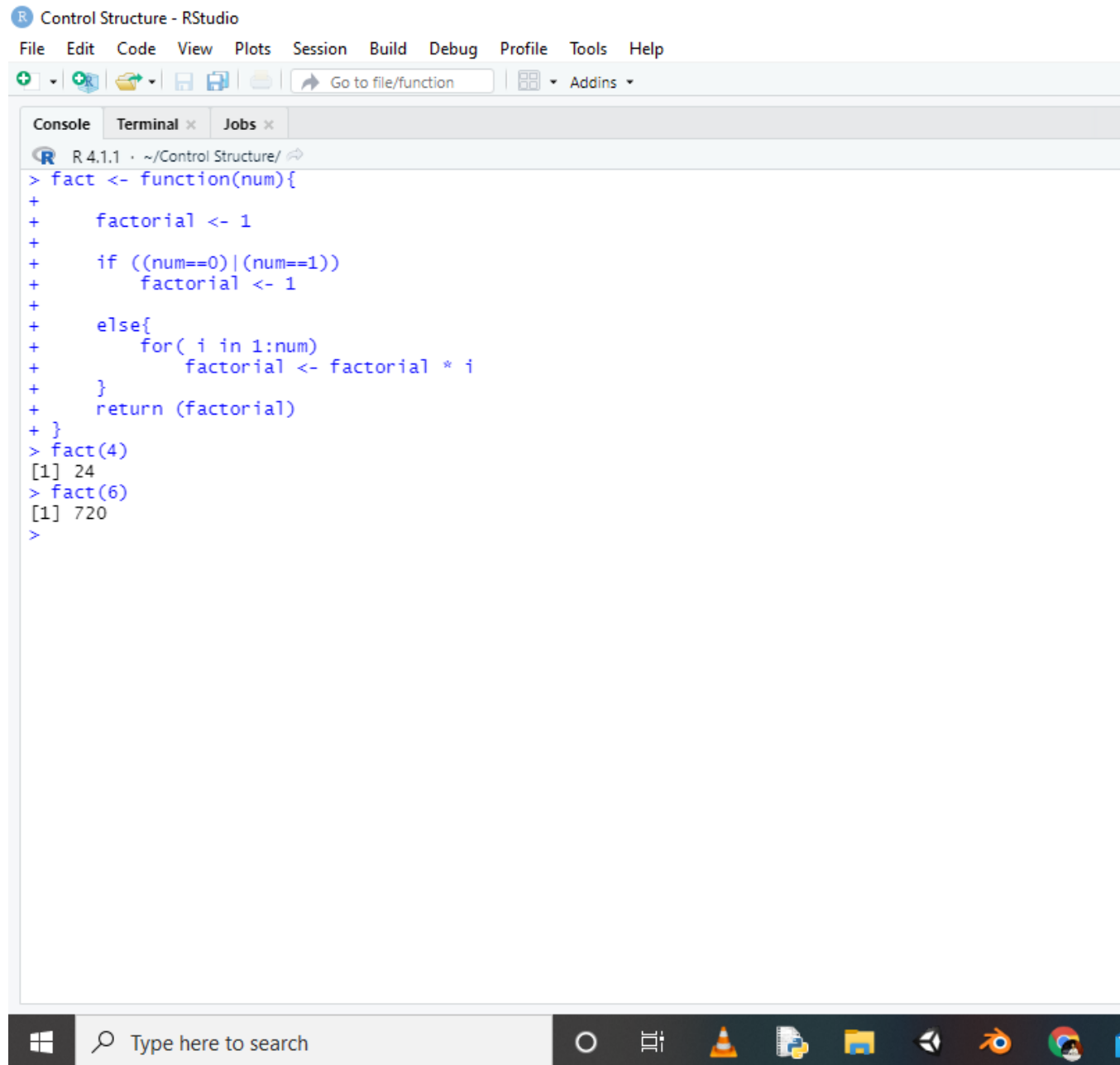


The screenshot displays the RStudio Control Structure interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu is a toolbar with icons for file operations and a search bar labeled 'Go to file/function'. The main window is divided into three panes: Console, Terminal, and Jobs. The Console pane shows the R 4.1.1 session with the following commands and output:

```
R 4.1.1 ~ /Control Structure/  
> print(sum(1:10))  
[1] 55  
> print(seq(1:10))  
[1] 1 2 3 4 5 6 7 8 9 10  
> print(mean(12:40))  
[1] 26  
> print(mode(12:40))  
[1] "numeric"  
> print(median(12:40))  
[1] 26  
> |
```

The Windows taskbar at the bottom shows the search bar 'Type here to search' and several application icons including the Start button, File Explorer, and various utility programs.

Example of User Defined Function



The screenshot displays the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Build, Debug, Profile, Tools, and Help. Below the menu is a toolbar with icons for saving, opening, and navigating files. The main console window shows the following R code and output:

```
R 4.1.1 · ~/Control Structure/
> fact <- function(num){
+   factorial <- 1
+   if ((num==0)|(num==1))
+     factorial <- 1
+   else{
+     for( i in 1:num)
+       factorial <- factorial * i
+   }
+   return (factorial)
+ }
> fact(4)
[1] 24
> fact(6)
[1] 720
>
```

The Windows taskbar at the bottom shows the Start button, a search bar, and several application icons including a web browser, a file explorer, and a terminal.

In above figure name of function is fact and we are calling the function by using fact(num).

Thank You