 <b>VIT</b>   Vidyalkar Institute of Technology ACCREDITED A+ BY NAAC	<b>Department of Information Technology</b>
---	---

<b>Semester</b>	<b>S.E. Semester III – INFT</b>
<b>Subject</b>	<b>Computer programming Paradigms Lab</b>
<b>Laboratory Teacher:</b>	<b>Shruti Agrawal</b>
<b>Laboratory</b>	<b>-</b>

<b>Student Name</b>	<b>Soham Sahare</b>	
<b>Roll Number</b>	<b>18101B0010</b>	
<b>Grade and Subject Teacher's Signature</b>		

<b>Experiment Number</b>	<b>1</b>	
<b>Experiment Title</b>	<b>To understand basic datatypes and function in R</b>	
<b>Problem Statement</b>	<b>Write an R program to print Fibonacci series of n numbers.</b>	
<b>Resources / Apparatus Required</b>	<b>Hardware: Desktop/Laptop</b>	<b>Software: RStudio</b>
<b>Code:</b>	<pre> nterms = as.integer(readline(prompt="How many terms? "))  n1 = 0 n2=1 count = 2  if(nterms &lt;= 0) { </pre>	

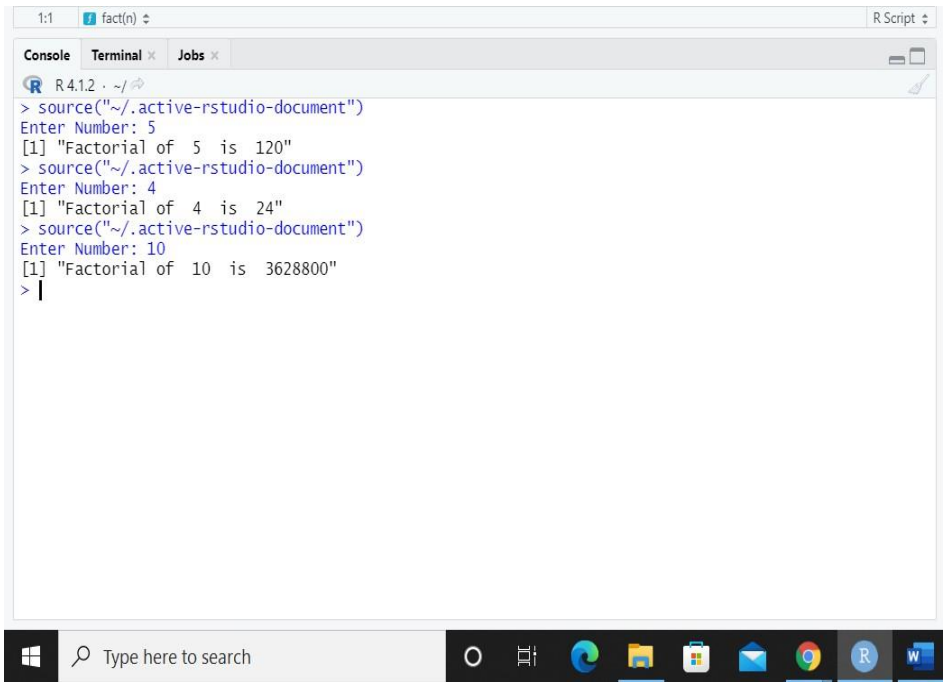
	<pre> print("Plese enter a positive integer") } else {   if(nterms == 1) {     print("Fibonacci sequence:")     print(n1)   } else {     print("Fibonacci sequence:")     print(n1)     print(n2)     while(count &lt; nterms){       nth = n1 + n2       print(nth)       n1 = n2       n2 = nth       count = count + 1     }   } } </pre>
<p><b>Output:</b></p>	 <pre> R 4.1.2 ~ / How many terms? 1 [1] "Fibonacci sequence:" [1] 0 &gt; source("C:/Users/HRUDYESH SALUNKE/Desktop/R Lab/Fibonacci_Sequence.R") How many terms? 2 [1] "Fibonacci sequence:" [1] 0 [1] 1 [1] 1 &gt; source("C:/Users/HRUDYESH SALUNKE/Desktop/R Lab/Fibonacci_Sequence.R") How many terms? 0 [1] "Plese enter a positive integer" &gt; source("C:/Users/HRUDYESH SALUNKE/Desktop/R Lab/Fibonacci_Sequence.R") How many terms? 3 [1] "Fibonacci sequence:" [1] 0 [1] 1 [1] 1 &gt; source("C:/Users/HRUDYESH SALUNKE/Desktop/R Lab/Fibonacci_Sequence.R") How many terms? 4 [1] "Fibonacci sequence:" [1] 0 [1] 1 [1] 1 [1] 2 &gt;   </pre>

 <b>VIT</b>   Vidyankar Institute of Technology ACCREDITED A+ BY NAAC	<b>Department of Information Technology</b>
---	---

<b>Semester</b>	<b>S.E. Semester III – INFT</b>
<b>Subject</b>	<b>Computer programming Paradigms Lab</b>
<b>Laboratory Teacher:</b>	<b>Shruti Agrawal</b>
<b>Laboratory</b>	<b>-</b>

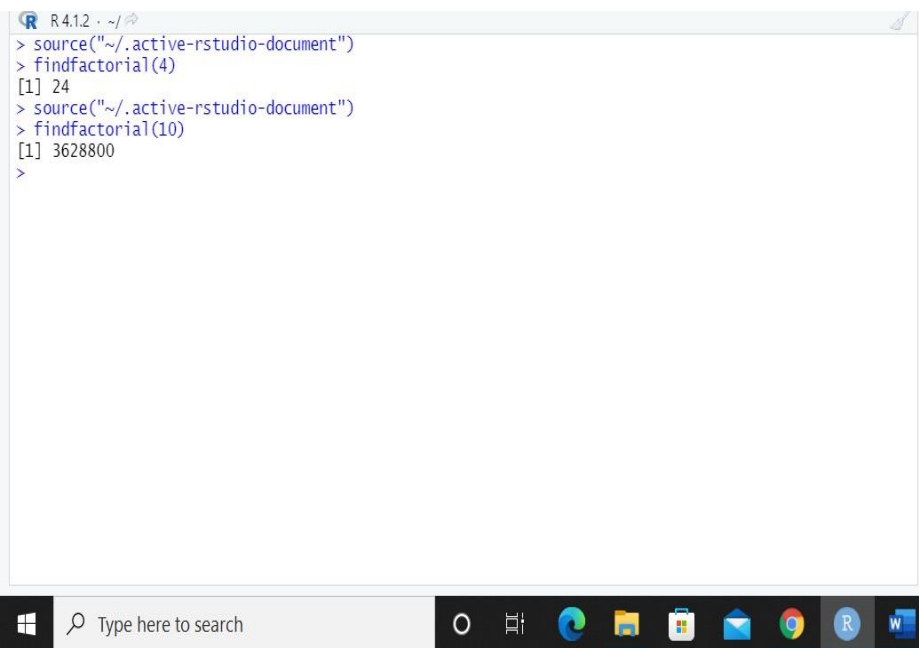
<b>Student Name</b>	<b>Soham Sahare</b>	
<b>Roll Number</b>	<b>18101B0010</b>	
<b>Grade and Subject Teacher's Signature</b>		

<b>Experiment Number</b>	<b>2</b>	
<b>Experiment Title</b>	<b>To understand recursion in R</b>	
<b>Problem Statement</b>	<b>Write a R program to find the factorial of any number n (using recursion and without using recursion as well).</b>	
<b>Resources / Apparatus Required</b>	<b>Hardware: Desktop/Laptop</b>	<b>Software: R Studio</b>
<b>Code:</b>	<b>1.With Recursion:</b>  <pre> fact &lt;- function(n){   if(n &lt;= 1){     return(1)   }   else {     return(n * fact(n-1))   } } </pre>	

	<pre> <b>n = as.integer(readline(prompt = "Enter Number:"))</b> <b>f = fact(n)</b> <b>print(paste("Factorial of ", n, " is ", f))</b>  <b>2.Without Recursion :</b>  <b>findfactorial &lt;- function(n){</b>  <b>  factorial &lt;- 1</b>  <b>  if ((n==0) (n==1))</b> <b>    factorial &lt;- 1</b>  <b>  else{</b> <b>    for( i in 1:n)</b> <b>      factorial &lt;- factorial * i</b> <b>  }</b> <b>  return (factorial)</b> </pre>
<b>Output:</b>	<b>1.With Recursion</b>  <p>The screenshot shows the RStudio interface with the console pane active. The script 'fact(n)' is loaded. The console output shows three successful calls to the factorial function: for input 5, the output is 120; for input 4, the output is 24; and for input 10, the output is 3628800. The Windows taskbar is visible at the bottom of the window.</p> <pre> R 4.1.2 ~/.active-rstudio-document &gt; source("~/active-rstudio-document") Enter Number: 5 [1] "Factorial of 5 is 120" &gt; source("~/active-rstudio-document") Enter Number: 4 [1] "Factorial of 4 is 24" &gt; source("~/active-rstudio-document") Enter Number: 10 [1] "Factorial of 10 is 3628800" &gt;   </pre>

## 2. Without Recursion

```
R 4.1.2 · ~/
> source("~/active-rstudio-document")
> findfactorial(4)
[1] 24
> source("~/active-rstudio-document")
> findfactorial(10)
[1] 3628800
>
```

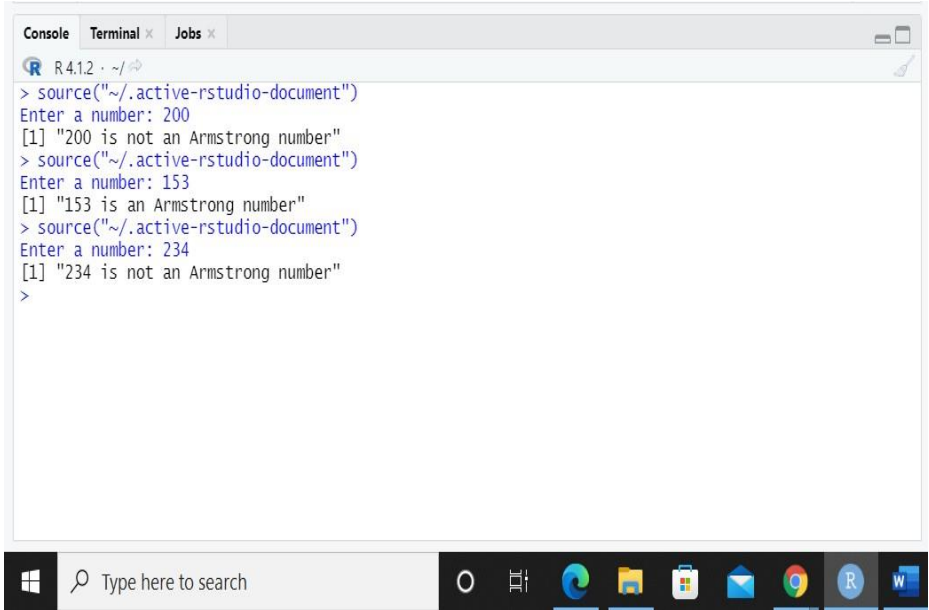


 <b>VIT</b>   Vidyankar Institute of Technology ACCREDITED A+ BY NAAC	<b>Department of Information Technology</b>
---	---

<b>Semester</b>	<b>S.E. Semester III – INFT</b>
<b>Subject</b>	<b>Computer programming Paradigms Lab</b>
<b>Laboratory Teacher:</b>	<b>Shruti Agrawal</b>
<b>Laboratory</b>	<b>-</b>

<b>Student Name</b>	<b>Soham Sahare</b>	
<b>Roll Number</b>	<b>18101B0010</b>	
<b>Grade and Subject Teacher's Signature</b>		

<b>Experiment Number</b>	<b>3</b>	
<b>Experiment Title</b>	<b>To understand conditional execution in R</b>	
<b>Problem Statement</b>	<b>Write a R program to check if the given number is Armstrong or not.</b>	
<b>Resources / Apparatus Required</b>	<b>Hardware: Desktop/Laptop</b>	<b>Software: RStudio</b>
<b>Code:</b>	<pre> num = as.integer(readline(prompt="Enter a number: "))  sum = 0 temp = num while(temp &gt; 0) {   digit = temp %% 10   sum = sum + (digit ^ 3)   temp = floor(temp / 10) } </pre>	

	<pre><b>if(num == sum) {   print(paste(num, "is an Armstrong number")) } else {   print(paste(num, "is not an Armstrong number")) }</b></pre>
<b>Output:</b>	 <p>The screenshot shows an R console window with the following text:</p> <pre>R 4.1.2 · ~/&gt; &gt; source("~/active-rstudio-document") Enter a number: 200 [1] "200 is not an Armstrong number" &gt; source("~/active-rstudio-document") Enter a number: 153 [1] "153 is an Armstrong number" &gt; source("~/active-rstudio-document") Enter a number: 234 [1] "234 is not an Armstrong number" &gt;</pre> <p>The window has tabs for Console, Terminal, and Jobs. The Windows taskbar is visible at the bottom with the search bar and various application icons.</p>

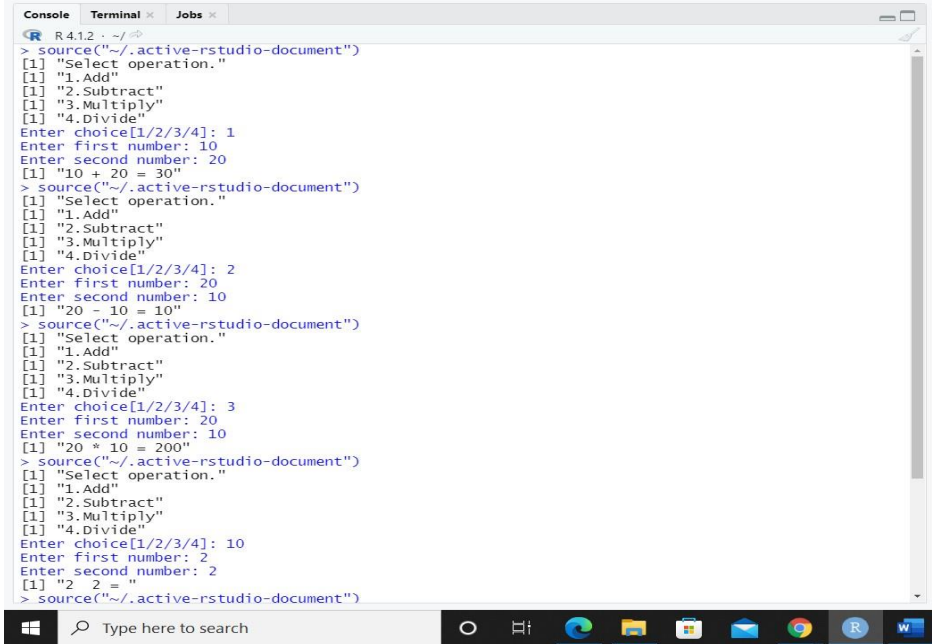
 <b>VIT</b>   Vidyalankar Institute of Technology ACCREDITED A+ BY NAAC	<b>Department of Information Technology</b>
---	---

<b>Semester</b>	<b>S.E. Semester III – INFT</b>
<b>Subject</b>	<b>Computer programming Paradigms Lab</b>
<b>Laboratory Teacher:</b>	<b>Shruti Agrawal</b>
<b>Laboratory</b>	<b>-</b>

<b>Student Name</b>	<b>Soham Sahare</b>	
<b>Roll Number</b>	<b>18101B0010</b>	
<b>Grade and Subject Teacher's Signature</b>		

<b>Experiment Number</b>	<b>4</b>	
<b>Experiment Title</b>	<b>To understand conditional execution in R</b>	
<b>Problem Statement</b>	<b>Write a menu driven R program to demonstrate a calculator</b>	
<b>Resources / Apparatus Required</b>	<b>Hardware: Desktop/Laptop</b>	<b>Software: R Studio</b>
<b>Code:</b>	<pre> add &lt;- function(x, y) {   return(x + y) } subtract &lt;- function(x, y) {   return(x - y) } multiply &lt;- function(x, y) {   return(x * y) } </pre>	



	<pre> <b>divide &lt;- function(x, y) {</b> <b>  return(x /y)</b> <b>}</b>  <b>print("Select operation.")</b> <b>print("1.Add")</b> <b>print("2.Subtract")</b> <b>print("3.Multiply")</b> <b>print("4.Divide")</b> <b>choice = as.integer(readline(prompt="Enter choice[1/2/3/4]: "))</b> <b>num1 = as.integer(readline(prompt="Enter first number: "))</b> <b>num2 = as.integer(readline(prompt="Enter second number: "))</b> <b>operator &lt;- switch(choice,"+","-","*","/")</b> <b>result &lt;- switch(choice, add(num1, num2), subtract(num1, num2),</b> <b>multiply(num1, num2), divide(num1, num2))</b> <b>print(paste(num1, operator, num2, "=", result))</b> </pre>
<b>Output:</b>	 <pre> R 4.1.2 ~ - / &gt; source("~/active-rstudio-document") [1] "Select operation." [1] "1.Add" [1] "2.Subtract" [1] "3.Multiply" [1] "4.Divide" Enter choice[1/2/3/4]: 1 Enter first number: 10 Enter second number: 20 [1] "10 + 20 = 30" &gt; source("~/active-rstudio-document") [1] "Select operation." [1] "1.Add" [1] "2.Subtract" [1] "3.Multiply" [1] "4.Divide" Enter choice[1/2/3/4]: 2 Enter first number: 20 Enter second number: 10 [1] "20 - 10 = 10" &gt; source("~/active-rstudio-document") [1] "Select operation." [1] "1.Add" [1] "2.Subtract" [1] "3.Multiply" [1] "4.Divide" Enter choice[1/2/3/4]: 3 Enter first number: 20 Enter second number: 10 [1] "20 * 10 = 200" &gt; source("~/active-rstudio-document") [1] "Select operation." [1] "1.Add" [1] "2.Subtract" [1] "3.Multiply" [1] "4.Divide" Enter choice[1/2/3/4]: 10 Enter first number: 2 Enter second number: 2 [1] "2 2 = " &gt; source("~/active-rstudio-document") </pre>

```
Console Terminal Jobs
R 4.1.2 · ~/
[1] "Select operation."
[1] "1.Add"
[1] "2.Subtract"
[1] "3.Multiply"
[1] "4.Divide"
Enter choice[1/2/3/4]: 2
Enter first number: 20
Enter second number: 10
[1] "20 - 10 = 10"
> source("~/active-rstudio-document")
[1] "Select operation."
[1] "1.Add"
[1] "2.Subtract"
[1] "3.Multiply"
[1] "4.Divide"
Enter choice[1/2/3/4]: 3
Enter first number: 20
Enter second number: 10
[1] "20 * 10 = 200"
> source("~/active-rstudio-document")
[1] "Select operation."
[1] "1.Add"
[1] "2.Subtract"
[1] "3.Multiply"
[1] "4.Divide"
Enter choice[1/2/3/4]: 10
Enter first number: 2
Enter second number: 2
[1] "2 * 2 = "
> source("~/active-rstudio-document")
[1] "Select operation."
[1] "1.Add"
[1] "2.Subtract"
[1] "3.Multiply"
[1] "4.Divide"
Enter choice[1/2/3/4]: 4
Enter first number: 20
Enter second number: 10
[1] "20 / 10 = 2"
>
```