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	Marwadi University **Faculty of Technology** **Department of Information and Communication Technology**
Subject: Introduction to R and R Studio (01CT0106)	**Aim: Understanding Functions using R**
Experiment: 06	**Date: 16/03/2023** | **Enrollment No: 92200133030**

Aim: Understanding Functions using R

IDE: R Studio

Theory:

Functions are useful when you want to perform a certain task multiple times. A function accepts input arguments and produces the output by executing valid R commands that are inside the function. In R Programming Language when you are creating a function the function name and the file in which you are creating the function need not be the same and you can have one or more functions in R.

Creating a Function in R

Functions are created in R by using the command function(). The general structure of the function file is as follows:

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

Function Components

The different parts of a function are −

- Function Name − This is the actual name of the function. It is stored in R environment as an object with this name.
- Arguments − An argument is a placeholder. When a function is invoked, you pass a value to the argument. Arguments are optional; that is, a function may contain no arguments. Also arguments can have default values.
- Function Body − The function body contains a collection of statements that defines what the function does.
- Return Value − The return value of a function is the last expression in the function body to be evaluated.

Types of Function in R Language
1. **Built-in Function:** Built-in functions in R are pre-defined functions that are available in R programming languages to perform common tasks or operations**.**
2. **User-defined Function:** R language allow us to write our own function.
3.

Built-in Function in R Programming Language
We will use built-in functions like sum(), max() and min()

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User-defined Functions in R Programming Language

R provides built-in functions like **print**(), **cat**(), etc. but we can also create our own functions. These functions are called user-defined functions.

Programs:

Write R script that demonstrates the working of functions:
1. Create a user define function named sum which accept 2 arguments (of integer type) and return the sum of them.
2. Create a user define function named avg which pass array as argument (of integer type) and return its average value.
3. Create a user define function named evenodd which accept one argument (of integer type) and return if the number is even or odd.
4. Create a user define function named fact which accept one argument (of integer type) and return the factorial of given number.
5. Create a user define function named prime which accept one argument (of integer type) and display that the no is prime or not. (no need to return value)
6. Create a user define function named power which accept two arguments (of integer type) (i) base (ii) expon and display the base^expon value.
7. Write a function to count the simple interest
8. Write a function to generate the square of any given number
9. Write a function which should work as a power function
10. Write a function which should work as absolute function
11. Write A R Program to Count the number of digit in a user entered number.
12. Write A R Program That prints the Prime Number in Between the Range given by user.
13. Write A R Program to make A Calculator.

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```r
sum <- function(a, b) {
  return(a + b)
}


num1 <- as.integer(readline("Enter the first number:- "))
num2 <- as.integer(readline("Enter the second number:- "))

result <- sum(num1, num2)

print(paste("The sum of", num1, "and", num2, "is", result))
```

```r
avg <- function(arr) {
  if (length(arr) == 0) {
    print("Array is empty.")
    return()
  }

  for(i in 1:length(arr)){
    temp = arr[i]
    total <- total + temp
    average <- total / length(arr)
  }

  return(average)
}

numbers <- c(5, 10, 15, 20, 25)

result <- avg(numbers)
if (!is.null(result)) {
  print(paste("Average:", result))
}
```

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```r
evenodd <- function(num) {
  if (num %% 2 == 0) {
    return("Even")
} else {
  return("Odd")
}
}

result <- evenodd(25)
print(result)
```

```r
fact <- function(num) {
  if (num == 0 || num == 1) { return(1)
  } else {
    return(num * fact(num - 1))
  }
}
result <- fact(6)
print(result)
```

```r
prime <- function(num) {
  is_prime <- TRUE

if (num <= 1) {
  is_prime <- FALSE
} else {
  for (i in 2:sqrt(num)) {
    if (num %% i == 0) {
      is_prime <- FALSE
      break
  }
  }
}

if (is_prime) {
  print(paste(num, "is a prime number."))
} else {
  print(paste(num, "is not a prime number."))
}
}
prime(25)
```

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```r
power <- function(base, expon) {
  result <- base ^ expon
  print(paste(base, "^", expon, "=", result))
}
power(5, 3)
```

```r
simple_interest <- function(principal, rate, time) {
  interest <- (principal * rate * time) / 100
  return(interest)
}
interest <- simple_interest(5000, 5, 3)
print(interest)
```

```r
square <- function(num) {
  result <- num^2
  return(result)
}
result <- square(5) print(result)
```

```r
power <- function(base, expon) {
  result <- base ** expon
  return(result)
}
result <- power(2, 3)
print(result)
```

```r
absolute <- function(num) {
  result <- abs(num)
  return(result)
}

result <- absolute(-25) print(result)
```

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```r
countDigits <- function() {
  number <- as.integer(readline("Enter a number: "))
  digitCount <- nchar(as.character(number))
  print(paste("Number of digits:", digitCount))
}

countDigits()
```

```r
isPrime <- function(num) {
  if (num <= 1) { return(FALSE)
}

  for (i in 2:sqrt(num)) {
    if (num %% i == 0) {
      return(FALSE)
  }
  }

  return(TRUE)
}

printPrimeNumbers <- function() {
  lower <- as.integer(readline("Enter the lower bound of the range: "))
  upper <- as.integer(readline("Enter the upper bound of the range: "))

  if (lower >= upper) {
    print("Invalid range. Please enter a valid range.") return()
  }

  print("Prime numbers in the given range:") for (num in lower:upper) {
    if (isPrime(num)) { print(num)
    }
  }
}

printPrimeNumbers()
```

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```r
add <- function(a, b) {
  return(a + b)
}

subtract <- function(a, b) {
  return(a - b)
}

multiply <- function(a, b) {
  return(a * b)
  }

divide <- function(a, b) { if (b != 0) {
  return(a / b)
} else {
  print("Error: Division by zero!") return(NA)
}
}
```

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```r
getChoice <- function() {
  print("Calculator Menu:")
  print("1. Addition")
  print("2. Subtraction")
  print("3. Multiplication")
  print("4. Division")
  print("5. Exit")

  choice <- as.integer(readline("Enter your choice: "))

  return(choice)
}

calculator <- function() {
  while (TRUE) {
  choice <- getChoice()

  if (choice == 5) {
    break
  }

  num1 <- as.numeric(readline("Enter the first number: "))
  num2 <- as.numeric(readline("Enter the second number: "))

  result <- switch(choice,
                   add(num1, num2),
                   subtract(num1, num2),
                   multiply(num1, num2),
                   divide(num1, num2))
```

```r
  if (!is.na(result)) {
    print(paste("Result:", result))


    cat("\n")
  }

  print("Calculator exited.")
}}

  calculator()
```

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Output:

```
> num1 <- as.integer(readline("Enter the first number:- "))
Enter the first number:- 2
> num2 <- as.integer(readline("Enter the second number:- "))
Enter the second number:- 3
> sum <- function(a, b) {
+    return(a + b)
+ }
> result <- sum(num1, num2)
>
> print(paste("The sum of", num1, "and", num2, "is", result))
[1] "The sum of 2 and 3 is 5"
> |
```

```
> avg <- function(arr) {
+    if (length(arr) == 0) {
+       print("Array is empty.")
+       return()
+    }
+
+    for(i in 1:length(arr)){
+       temp = arr[i]
+       total <- total + temp
+       average <- total / length(arr)
+    }
+
+    return(average)
+ }
>
> numbers <- c(5, 10, 15, 20, 25)
>
> result <- avg(numbers)
> if (!is.null(result)) {
+    print(paste("Average:", result))
+ }
[1] "Average: 2035"
> |
```

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```r
> evenodd <- function(num) {
+    if (num %% 2 == 0) {
+      return("Even")
+ } else {
+    return("Odd")
+ }
+ }
>
> result <- evenodd(25)
> print(result)
[1] "Odd"
>
```

```r
> fact <- function(num) {
+    if (num == 0 || num == 1) {
+      return(1)
+    } else {
+      return(num * fact(num - 1))
+    }
+ }
> result <- fact(6)
> print(result)
[1] 720
>
```

```r
+    } else {
+      print(paste(num, "is not a prime number."))
+    }
+ }
> prime(25)
[1] "25 is not a prime number."
>
```

```r
> power <- function(base, expon) {
+    result <- base ^ expon
+    print(paste(base, "^", expon, "=", result))
+ }
> power(5, 3)
[1] "5 ^ 3 = 125"
>
```

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```
> simple_interest <- function(principal, rate, time) {
+    interest <- (principal * rate * time) / 100
+    return(interest)
+ }
> interest <- simple_interest(5000, 5, 3)
> print(interest)
[1] 750
>
```

```
> square <- function(num) {
+    result <- num^2
+    return(result)
+ }
> result <- square(5)
> print(result)
[1] 25
>
```

```
> power <- function(base, expon) {
+    result <- base ** expon
+    return(result)
+ }
> result <- power(2, 3)
> print(result)
[1] 8
```

```
[1] 8
> absolute <- function(num) {
+    result <- abs(num)
+    return(result)
+ }
> result <- absolute(-25)
> print(result)
[1] 25
>
```

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```
>
> countDigits()
Enter a number: 555
[1] "Number of digits: 3"
>
```

```
> printPrimeNumbers()
Enter the lower bound of the range: 5
Enter the upper bound of the range: 10
[1] "Prime numbers in the given range:"
[1] 5
[1] 7
>
```

```
> calculator()
[1] "Calculator Menu:"
[1] "1. Addition"
[1] "2. Subtraction"
[1] "3. Multiplication"
[1] "4. Division"
[1] "5. Exit"
Enter your choice: 2
Enter the first number: 10
Enter the second number: 5
[1] "Result: 5"
```

Observation and Learnings:

_____
_____
_____.