Lab Program 1

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Program to check what type of Triangle given 3 sides, and calculate its area

Validating the triangle

```
is_valid_triangle <- function(a, b, c) {
  return ((a + b > c) & (b + c > a) & (a + c > b ))
}
```

Function to check the type of triangle

```
triangle_type <- function(a , b , c) {
  if (a == b && b == c) {
    return(" Equilateral ")
  } else if ( a == b || b == c || a == c) {
    return(" Isosceles ")
  } else {
    return("Scalene")
  }
}
```

Calculating Area using Heron's Formula

```
triangle_area <- function(a , b , c) {
  s <- (a + b + c) / 2 # Semi - perimeter
  # Heron 's formula
  area <- sqrt (s * (s - a) * (s - b) * (s - c))
  return (area)
}
```

Validating inputs

```r
validate_input <- function(x) {
  if (!is.numeric(x) || x <= 0) {
    stop("Error : Input must be a positive number.")
  }
  return(TRUE)
}
```

Main Code Block

1. Defining 3 variables representing the 3 sides of the triangle

```r
cat("Enter the lengths of the sides of the triangle :\n")
```

```
## Enter the lengths of the sides of the triangle :
```

```r
a <- as.numeric(readline(prompt = "Side A: "))
```

```
## Side A:
```

```r
b <- as.numeric(readline(prompt = "Side B: "))
```

```
## Side B:
```

```r
c <- as.numeric(readline(prompt = "Side C: "))
```

```
## Side C:
```

2. Input Validation and implementation of all the functions.

```r
# Input validation}
tryCatch ({
  validate_input(a)
  validate_input(b)
  validate_input(c)

  # Check if the inputs form a valid triangle
  if (!is_valid_triangle(a , b , c)) {
    stop("Error : The given sides do not form a valid triangle.")
  }

  # Determine the type of triangle
  type_of_triangle <- triangle_type(a , b , c)
  cat("The triangle is:", type_of_triangle, "\n")
  # Calculate the area of the triangle
  area_of_triangle <- triangle_area(a, b, c)
  cat("The area of the triangle is:", area_of_triangle, "\n")

}, error = function(e){
  cat(e$message, "\n")
})
```

```
## missing value where TRUE/FALSE needed
```

Sample Output

Enter the lengths of the sides of the triangle:

Side a: 5

Side b: 5

Side c: 8

The triangle is: Isosceles

The area of the triangle is: 12

Enter the lengths of the sides of the triangle:

Side a: 1

Side b: 2

Side c: 8

Error: The given sides do not form a valid triangle.