Lab Program - 1

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

This R program validates the sides of the triangle (taken as input from the user) and then if valid, calculates the area of the triangle using Heron's formula and checks what type of triangle it is

```r
# Validating the triangle
is_valid_triangle <- function(a, b, c) {
  return ((a + b > c) & (b + c > a) & (a + c > b ))
}
```

```r
# 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")
  }
}
```

```r
# 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)
}
```

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

```r
## Main Code Block

# 1. Defining 3 variables representing the 3 sides of the triangle
cat("Enter the lengths of the sides of the triangle :\n")
```

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

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

```
Side A:
```

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

```
Side B:
```

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

```
Side C:
```

```
# 2.  Input Validation and implementation of all the functions.
# 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.
```