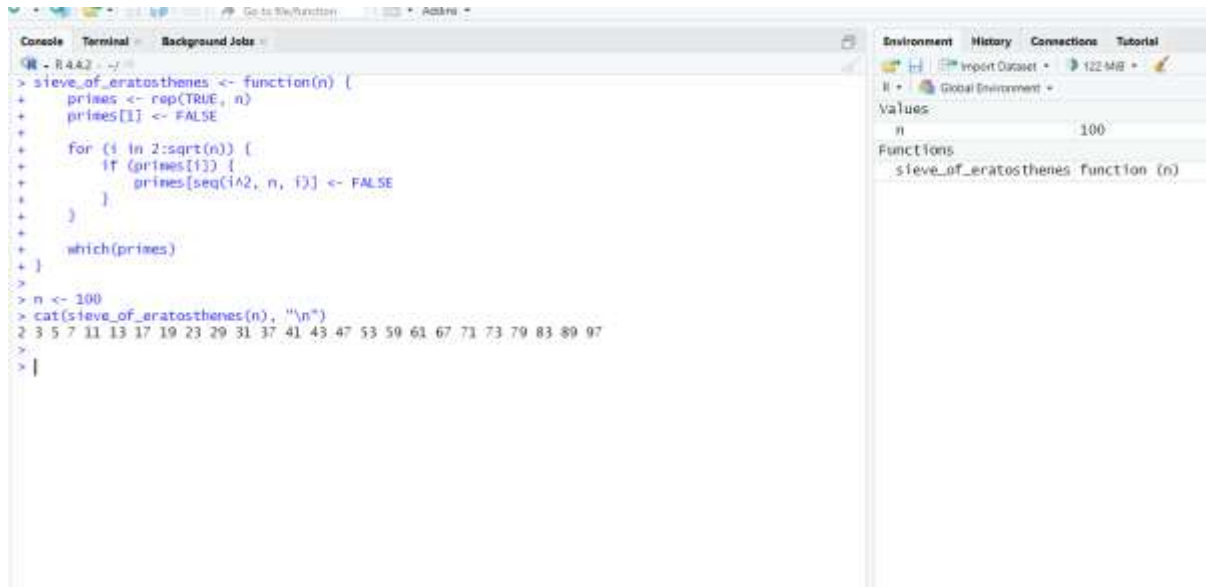


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LAB-2

1. Write a R program to get all prime numbers up to a given number (based on the sieve of Eratosthenes).



```
> sieve_of_eratosthenes <- function(n) {  
+   primes <- rep(TRUE, n)  
+   primes[1] <- FALSE  
+  
+   for (i in 2:sqrt(n)) {  
+     if (primes[i]) {  
+       primes[seq(i^2, n, i)] <- FALSE  
+     }  
+   }  
+   which(primes)  
+ }  
  
> n <- 100  
> cat(sieve_of_eratosthenes(n), "\n")  
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97  
> |
```

2. Write a R program to print the numbers from 1 to 100 and print "Fizz" for multiples of 3, print "Buzz" for multiples of 5, and print "FizzBuzz" for multiples of both.

```

R 4.4.2 ->
> for (i in 1:100) {
+   if (i % 3 == 0 && i % 5 == 0) {
+     cat("FizzBuzz\n")
+   } else if (i % 3 == 0) {
+     cat("Fizz\n")
+   } else if (i % 5 == 0) {
+     cat("Buzz\n")
+   } else {
+     cat(i, "\n")
+   }
+ }
1
2
Fizz
4
Buzz
Fizz
7
8
Fizz
Buzz
11
Fizz
13
14
FizzBuzz
16
17
Fizz
19
Buzz
Fizz
22
23
Fizz
Buzz
26
Fizz
28
29
FizzBuzz
31
32
Fizz
34
Buzz
Fizz

```

The screenshot shows the RStudio interface. The Console pane on the left displays the execution of a for loop that iterates from 1 to 100. It prints the number 'i' for most values, but replaces it with 'Fizz' for multiples of 3, 'Buzz' for multiples of 5, and 'FizzBuzz' for multiples of both. The Environment pane on the right shows a single variable 'i' with a value of 100L.

3. Write a R program to extract first 10 English letters in lower case and last 10 letters in upper case and extract letters between 22nd to 24th letters in upper case.

```

R 4.4.2 ->
> letters_lower <- letters[1:10]
> letters_upper <- toupper(letters[17:26])
> letters_between_22_24 <- toupper(letters[22:24])
>
> cat("First 10 letters in lowercase:", paste(letters_lower, collapse = ""), "\n")
First 10 letters in lowercase: abcdefghij
> cat("Last 10 letters in uppercase:", paste(letters_upper, collapse = ""), "\n")
Last 10 letters in uppercase: QRSUVWXYZ
> cat("Letters between 22nd and 24th in uppercase:", paste(letters_between_22_24, collapse = ""),
      "\n")
Letters between 22nd and 24th in uppercase: VWX
>

```

The screenshot shows the RStudio interface. The Console pane on the left displays the execution of code that extracts specific letters from the alphabet. It creates three character vectors: 'letters_lower' (first 10 lowercase letters), 'letters_upper' (last 10 uppercase letters), and 'letters_between_22_24' (uppercase letters from the 22nd to 24th positions). The Environment pane on the right shows the values of these three vectors.

Variable	Value
letters_between_22_24	chr [1:3] "V" "W" "X"
letters_lower	chr [1:10] "a" "b" "c" "d" "e" "f" "g" "h" "i" "j"
letters_upper	chr [1:10] "Q" "R" "S" "T" "U" "V" "W" "X" "Y" "Z"

4. Write a R program to find the factors of a given number.



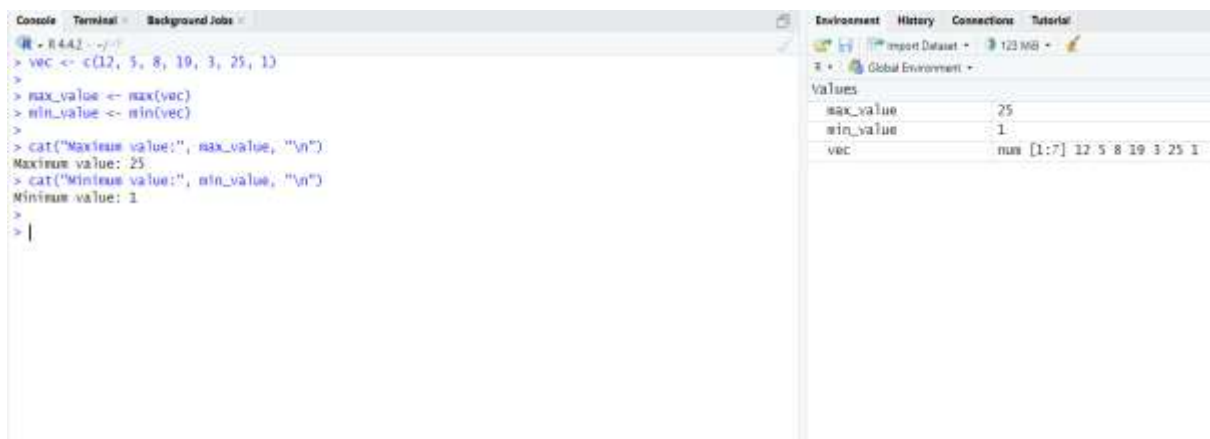
The screenshot shows the R Studio interface. The console on the left contains the following code and output:

```
> find_factors <- function(n) {  
+   factors <- which(n %%% 1:n == 0)  
+   return(factors)  
+ }  
>  
> n <- 36  
> cat("Factors of", n, "are:", find_factors(n), "\n")  
Factors of 36 are: 1 2 3 4 6 9 12 18 36  
>  
> |
```

The environment pane on the right shows the following:

Environment	History	Connections	Tutorial
R	Global Environment		
Values			
n			36
Functions			
find_factors			function (n)

5. Write a R program to find the maximum and the minimum value of a given vector.



The screenshot shows the R Studio interface. The console on the left contains the following code and output:

```
> vec <- c(12, 5, 8, 10, 3, 25, 1)  
>  
> max_value <- max(vec)  
> min_value <- min(vec)  
>  
> cat("Maximum value:", max_value, "\n")  
Maximum value: 25  
> cat("Minimum value:", min_value, "\n")  
Minimum value: 1  
>  
> |
```

The environment pane on the right shows the following:

Environment	History	Connections	Tutorial
R	Global Environment		
Values			
max_value			25
min_value			1
vec			max [1:7] 12 5 8 10 3 25 1