Lecture 4: Vectors and Factors in R

For each question below, write the R code you would use and record the result when appropriate. Answer in complete sentences when asked to explain.

Part 1: Creating and Summarizing a Vector

1. Create a vector called `x` containing the values

$$12,\ 7,\ 15,\ 9,\ 18,\ 6,\ 15,\ 11,\ 20,\ 8$$

   (a) Display the vector.

   (b) Determine the length of the vector.

   (c) Determine the mean.

   (d) Determine the median.

   (e) Determine the standard deviation.

   (f) Determine the minimum and maximum values.

   (g) Determine the range difference.

   (h) Sort the values from smallest to largest

Part 2: Logical Vectors and Indexing

2. Use logical vectors with `x` to answer the following:

   (a) Determine which values are greater than or equal to 12.

   (b) Determine how many values are greater than or equal to 12.

   (c) Display only the values greater than or equal to 12.

3. Use indexing with `x` to answer the following:

   (a) Display only the 4th element.

   (b) Display the 2nd, 5th, and 8th elements.

   (c) Display the last 3 elements.

Part 3: Creating New Vectors from Old Ones

4. Create a new vector called `y` by adding 5 to every element of `x`.

   (a) Display `y`.

   (b) Determine the mean of `y`.

   (c) Determine the standard deviation of `y`.

   (d) Compare the standard deviation of `x` and `y`. What do you notice?

5. Create a new vector called `z` by multiplying every element of `x` by 2.

   (a) Display `z`.

   (b) Determine the standard deviation of `z`.

   (c) Compare the standard deviation of `x` and `z`. What do you notice?

Part 4: Thinking About How R Works

6. Consider the following code:

```
a <- c(4, 7, 10, 13)
b <- c(1, 2)
a + b
```

   (a) Before running the code, predict what will happen.

   (b) Run the code and briefly explain why R gives this result.

7. Create the following vector:

```
mixed <- c(8, "apple", TRUE, 3)
```

   (a) What is the class of `mixed`?

   (b) What is the type of `mixed`?

   (c) Why did R treat the vector this way?

Part 5: Factors and Ordered Factors

8. Create a factor called `shirt_size` from the values

   ```
   c("Medium", "Small", "Large", "Medium", "Large", "Small")
   ```

   Then answer the following:

   (a) Display the factor.

   (b) List its levels.

   (c) Explain why a factor is useful for this type of data.

9. Create an ordered factor called `rating` from the values

   ```
   c("Low", "Medium", "High", "Medium", "Low")
   ```

   using the order Low < Medium < High.

   (a) Display the ordered factor.

   (b) List its levels.

   (c) Briefly explain why this should be an ordered factor instead of a regular factor.

Final Reflection

10. In one or two sentences, explain one way vectors are more useful than working with one value at a time in R.