

Teaching Unit 4: Strings

4.1 String Indexing

Solutions

4.1.1 - Trace

Determine the exact output. Explain the Java rule or state changes that produce it.

```
String word = "code";  
System.out.println(word.substring(0, 1) + word.substring(word.length() - 1));
```

Output

ce

The first slice includes index 0 only. The one-argument slice continues from index 3 to the end.

4.1.2 - Write code

Write public static String ends(String text). Assume text is nonempty. Return the first and last characters joined together; a one-character input contributes that character twice.

One valid solution is shown below. Other implementations satisfying the contract are also valid.

```
public static String ends(String text) {  
    return text.substring(0, 1) + text.substring(text.length() - 1);  
}
```

Check your code

```
System.out.println(ends("Java"));  
System.out.println(ends("Q"));
```

Expected output

Ja
QQ

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4.2 substring and indexOf

Solutions

4.2.1 - Trace

Determine the exact output. Explain the Java rule or state changes that produce it.

```
String text = "banana";
System.out.println(text.indexOf("ana"));
System.out.println(text.substring(2, 5));
```

Output

```
1
nan
```

indexOf finds the first occurrence, and substring(2, 5) uses indices 2, 3, and 4.

4.2.2 - Write code

Write public static String beforeColon(String text). Return the portion before the first colon, or the entire String if no colon occurs.

One valid solution is shown below. Other implementations satisfying the contract are also valid.

```
public static String beforeColon(String text) {
    int index = text.indexOf(":");
    if (index == -1) return text;
    return text.substring(0, index);
}
```

Check your code

```
System.out.println(beforeColon("key:value"));
System.out.println(beforeColon("plain"));
System.out.println "[" + beforeColon(":value") + "]" );
```

Expected output

```
key
plain
[]
```

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4.3 String Immutability

Solutions

4.3.1 - Trace

Determine the exact output. Explain the Java rule or state changes that produce it.

```
String a = "cat";  
String b = a;  
a += "s";  
System.out.println(a + ":" + b);
```

Output

cats:cat

Reassigning a does not change the immutable object still referenced by b.

4.3.2 - Write code

Given String word = "book" and String saved = word, replace word with its last three characters followed by "!". Print word and saved, separated by a colon.

One valid solution is shown below. Other implementations satisfying the contract are also valid.

```
String word = "book";  
String saved = word;  
word = word.substring(1) + "!";  
System.out.println(word + ":" + saved);
```

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4.4 String Traversal

Solutions

4.4.1 - Trace

Determine the exact output. Explain the Java rule or state changes that produce it.

```
String text = "dog";
String result = "";
for (int i = text.length() - 1; i >= 0; i--) {
    result += text.substring(i, i + 1);
}
System.out.println(result);
```

Output

god

The loop reads indices 2, 1, and 0 in that order.

4.4.2 - Write code

Write public static String removeA(String text), returning the text with every lowercase "a" omitted. Preserve the order of the remaining characters.

One valid solution is shown below. Other implementations satisfying the contract are also valid.

```
public static String removeA(String text) {
    String result = "";
    for (int i = 0; i < text.length(); i++) {
        String letter = text.substring(i, i + 1);
        if (!letter.equals("a")) result += letter;
    }
    return result;
}
```

Check your code

```
System.out.println(removeA("banana"));
System.out.println "[" + removeA("") + "];
```

Expected output

bnn
[]