This question involves analyzing and modifying a string. The following `Phrase` class maintains a phrase in an instance variable and has methods that access and make changes to the phrase. You will write two methods of the `Phrase` class.

```java
public class Phrase {
    private String currentPhrase;

    /** Constructs a new Phrase object. */
    public Phrase(String p) {
        currentPhrase = p;
    }

    /** Returns the index of the \text{nth} occurrence of \text{str} in the current phrase;
     * returns -1 if the \text{nth} occurrence does not exist.
     * \textbf{Precondition:} \text{str.length()} > 0 \text{ and } n > 0
     * \textbf{Postcondition:} the current phrase is not modified.
     */
    public int findNthOccurrence(String str, int n) {
        // implementation not shown
    }

    /** Modifies the current phrase by replacing the \text{nth} occurrence of \text{str} with \text{repl}.
     * If the \text{nth} occurrence does not exist, the current phrase is unchanged.
     * \textbf{Precondition:} \text{str.length()} > 0 \text{ and } n > 0
     */
    public void replaceNthOccurrence(String str, int n, String repl) {
        // to be implemented in part (a)
    }

    /** Returns the index of the last occurrence of \text{str} in the current phrase;
     * returns -1 if \text{str} is not found.
     * \textbf{Precondition:} \text{str.length()} > 0
     * \textbf{Postcondition:} the current phrase is not modified.
     */
    public int findLastOccurrence(String str) {
        // to be implemented in part (b)
    }

    /** Returns a string containing the current phrase. */
    public String toString() {
        return currentPhrase;
    }
}
```
(a) Write the Phrase method replaceNthOccurrence, which will replace the nth occurrence of the string str with the string repl. If the nth occurrence does not exist, currentPhrase remains unchanged.

Several examples of the behavior of the method replaceNthOccurrence are shown below.

<table>
<thead>
<tr>
<th>Code segments</th>
<th>Output produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phrase phrase1 = new Phrase(&quot;A cat ate late.&quot;);</td>
<td>A crane ate late.</td>
</tr>
<tr>
<td>phrase1.replaceNthOccurrence(&quot;at&quot;, 1, &quot;rane&quot;);</td>
<td></td>
</tr>
<tr>
<td>System.out.println(phrase1);</td>
<td></td>
</tr>
<tr>
<td>Phrase phrase2 = new Phrase(&quot;A cat ate late.&quot;);</td>
<td>A cat ate late.</td>
</tr>
<tr>
<td>phrase2.replaceNthOccurrence(&quot;at&quot;, 6, &quot;xx&quot;);</td>
<td></td>
</tr>
<tr>
<td>System.out.println(phrase2);</td>
<td></td>
</tr>
<tr>
<td>Phrase phrase3 = new Phrase(&quot;A cat ate late.&quot;);</td>
<td>A cat ate late.</td>
</tr>
<tr>
<td>phrase3.replaceNthOccurrence(&quot;bat&quot;, 2, &quot;xx&quot;);</td>
<td></td>
</tr>
<tr>
<td>System.out.println(phrase3);</td>
<td></td>
</tr>
<tr>
<td>Phrase phrase4 = new Phrase(&quot;aaaa&quot;);</td>
<td>xxaa</td>
</tr>
<tr>
<td>phrase4.replaceNthOccurrence(&quot;aa&quot;, 1, &quot;xx&quot;);</td>
<td></td>
</tr>
<tr>
<td>System.out.println(phrase4);</td>
<td></td>
</tr>
<tr>
<td>Phrase phrase5 = new Phrase(&quot;aaaa&quot;);</td>
<td>abbbba</td>
</tr>
<tr>
<td>phrase5.replaceNthOccurrence(&quot;aa&quot;, 2, &quot;bbb&quot;);</td>
<td></td>
</tr>
<tr>
<td>System.out.println(phrase5);</td>
<td></td>
</tr>
</tbody>
</table>

Class information for this question

```java
public class Phrase {
    private String currentPhrase;
    public Phrase(String p)
    public int findNthOccurrence(String str, int n)
    public void replaceNthOccurrence(String str, int n, String repl)
    public int findLastOccurrence(String str)
    public String toString()
}"
```

GO ON TO THE NEXT PAGE.
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The `Phrase` class includes the method `findNthOccurrence`, which returns the `n`th occurrence of a given string. You must use `findNthOccurrence` appropriately to receive full credit.

Complete method `replaceNthOccurrence` below.

```java
/**
 * Modifies the current phrase by replacing the nth occurrence of str with repl.
 * If the nth occurrence does not exist, the current phrase is unchanged.
 * Precondition: str.length() > 0 and n > 0
 */
public void replaceNthOccurrence(String str, int n, String repl)
```
AP® COMPUTER SCIENCE A FREE-RESPONSE QUESTION

(b) Write the Phrase method findLastOccurrence. This method finds and returns the index of the last occurrence of a given string in currentPhrase. If the given string is not found, -1 is returned. The following tables show several examples of the behavior of the method findLastOccurrence.

Phrase phrase1 = new Phrase("A cat ate late.");

<table>
<thead>
<tr>
<th>Method call</th>
<th>Value returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>phrase1.findLastOccurrence(&quot;at&quot;)</td>
<td>11</td>
</tr>
<tr>
<td>phrase1.findLastOccurrence(&quot;cat&quot;)</td>
<td>2</td>
</tr>
<tr>
<td>phrase1.findLastOccurrence(&quot;bat&quot;)</td>
<td>-1</td>
</tr>
</tbody>
</table>

Class information for this question

```java
public class Phrase {
    private String currentPhrase
    public Phrase(String p)
    public int findNthOccurrence(String str, int n)
    public void replaceNthOccurrence(String str, int n, String repl)
    public int findLastOccurrence(String str)
    public String toString()
}
```

WRITE YOUR SOLUTION ON THE NEXT PAGE.
You must use `findNthOccurrence` appropriately to receive full credit.

Complete method `findLastOccurrence` below.

```java
/**
 * Returns the index of the last occurrence of `str` in the current phrase;
 * returns -1 if `str` is not found.
 * Precondition: `str.length() > 0`
 * Postcondition: the current phrase is not modified.
 */
public int findLastOccurrence(String str)
```