Homework #1

CS 4120/5220 – Adv Appl Development in Java

Fall 2025

100 Points
Due: 09/12/2025, 11:59 PM

Instructions: Submit all required project files, including source code, as a single compressed archive (ZIP file). Ensure that your project is well-organized, with appropriate folder structures for source files, resources, and any required dependencies. Include a README file if necessary to explain how to run the program. Do not copy and paste code from external sources. Clearly comment on your code to explain important logic. Convert any written explanations, analysis, or required screenshots into a single PDF file and include it in the ZIP archive. Upload the ZIP file to Brightspace before the due date and time.

1. Write a Java program that acts as a simple calculator. The program should: **(20 points)**
    a. Prompt the user to enter two integer numbers.
    b. Ask the user to choose an operation from the following:
        i. Addition
        ii. Subtraction
        iii. Multiplication
        iv. Division
        v. Modulus
        vi. Bitwise AND
        vii. Bitwise OR
        viii. Bitwise XOR
        ix. Find the larger number using a ternary operator
    c. Perform the selected operation and display the result.
    d. Use a switch statement to handle the user's choice of operation.

Sample execution output:

```
"C:\Program Files\Java\jdk-23\bin\java.exe" "-javaagent:C:\Users\anand\AppData\Local\Programs\Inte
Enter first number: 10
Enter second number: 20
Choose an operation: +, -, *, /, %, &, |, ^, ?
+
Result: 30

Process finished with exit code 0
```

2. Write a Java program that analyzes daily temperatures for a city over a period of N days. The program should: **(30 points)**
    a. Accept temperature values for N days from the user and store them in an array.
    b. Find and display the following:
        i. The highest temperature and the day it occurred.
        ii. The lowest temperature and the day it occurred.
        iii. The average temperature over the given period.
    c. Determine the longest streak of days with increasing temperatures.
    d. Check if there were any days with the same temperature recorded.

    Sample execution output:

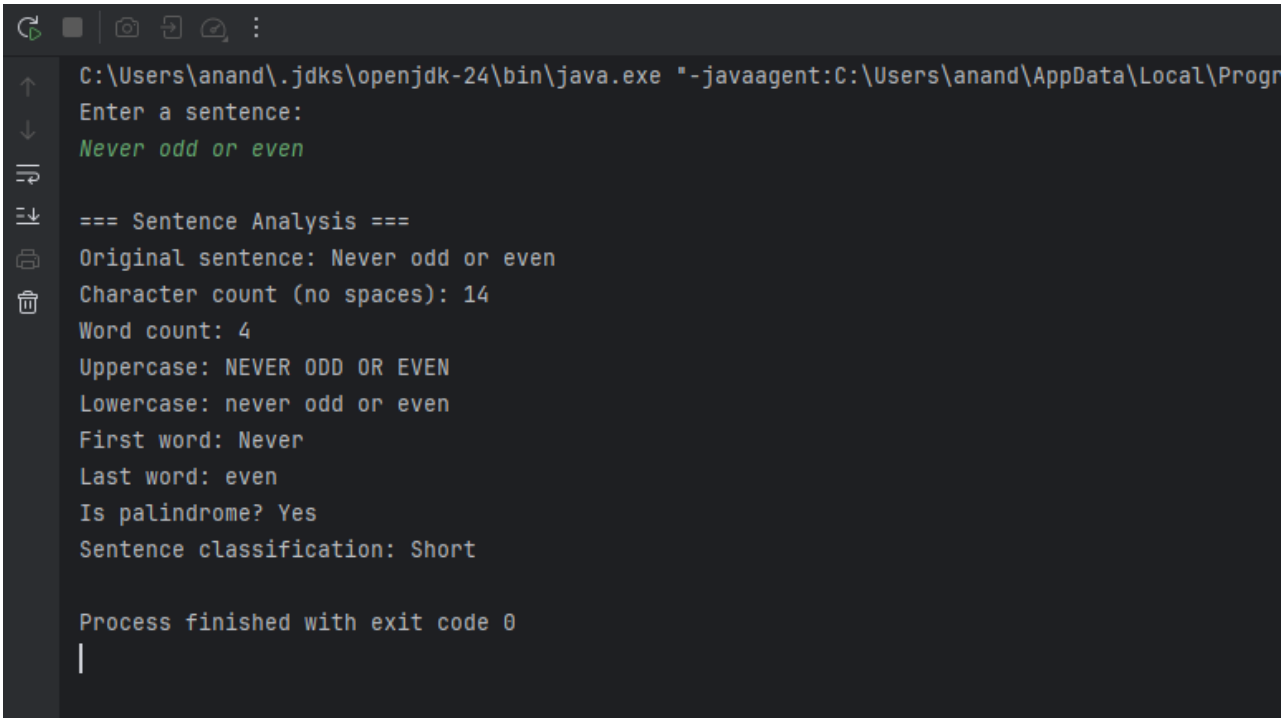
```
C:\Users\anand\.jdks\openjdk-24\bin\java.exe "-javaagent:C:\Users\anand\AppData\Local\Programs\IntelliJ IDEA Ultimate\lib\i
Enter number of days (N): 7
Enter 7 temperature values (one per line):
70
72
73
75
70
72
73

=== Temperature Analysis ===
Highest temperature: 75.00 (Day 4)
Lowest temperature : 70.00 (Day 1)
Average temperature: 72.14
Longest increasing streak: 4 days (Day 1 to Day 4)
Any duplicate temperatures recorded? Yes

Process finished with exit code 0
```

Additional Requirements:

- **Use a single-dimensional array to store temperatures.**
- **Use loops and conditional statements to perform the calculations.**
- **Do not use built-in sorting functions.**

3. Write a Java program to analyze and format a sentence entered by the user. The program should: **(30 points)**
    a. Prompt the user to enter a sentence.
    b. Perform and display the following operations using string functions:
        i. Count the total number of characters (excluding spaces).
        ii. Count the number of words in the sentence.
        iii. Display the sentence in all uppercase and all lowercase.
        iv. Display the first word and the last word.
        v. Check if the sentence is a palindrome (ignoring spaces and case).
    c. Classify the sentence as:
        i. Short: fewer than 20 characters.
        ii. Medium: 20-50 characters.
        iii. Long: more than 50 characters.

Sample execution output:



Hints:

- **Uses String class methods (length(), replace(), split(), substring(), equalsIgnoreCase(), etc.).**
- **Uses conditional checks to classify sentences.**

4. Write a java program that generates abbreviations for phrases using StringBuilder. **(20 points)**
   The program should:
   a. Accept a phrase from the user (e.g., "National Aeronautics and Space Administration").
   b. Generate an abbreviation using the first letter of each word in uppercase (e.g., “NASA”).
   c. Display the final abbreviation.

   Sample execution output:

```
"C:\Program Files\Java\jdk-23\bin\java.exe" "-javaagent:
Enter a phrase: World Health Organization
Generated Abbreviation: WHO

Process finished with exit code 0
```

   Additional Requirements:
   - **StringBuilder must be used for abbreviation generation.**
   - **Ensure that abbreviation is always in the uppercase.**
   - **Ignore extra space between words.**