**Week 5 summary:**

**Lecture 5-1 Summary:**

This lecture introduces key concepts in programming and data processing through practical examples:

1. **Two-Dimensional Arrays**:

• Understanding 2D arrays as arrays of 1D arrays, with row and column indexing starting at 0.

• Accessing elements using a[row][col].

• Practical examples include summing rows and displaying matrix data.

2. **Matrix Operations**:

• Performing addition and multiplication of matrices with a focus on dimension compatibility.

• Implementation and testing of matrix operations through coding examples.

3. **Reading and Processing Files**:

• Using file readers to process text file data.

• Example: Counting integer frequencies in a file.

4. **PageRank Algorithm**:

• Introduction to Google’s PageRank, which ranks web pages based on importance.

• Modeling web pages as a graph and computing PageRanks using random walks, transition matrices, and cumulative distribution functions (CDF).

• Implementation and example of calculating PageRanks for a web graph.

**Lecture 5-2 Summary:**

This lecture covers programming skills for input/output, graphics, and data visualization in Java:

1. **Standard Input and Output**:

• Understanding standard output (e.g., print, printf) and standard input handling using custom classes like In.

• Demonstrating file and process interaction through redirection (>, <, |).

2. **Graphics**:

• Basics of computer graphics with the physical and logical view of a canvas.

• Drawing shapes like lines and triangles using the StdDraw class.

• Emphasis on using mathematical models for graphical representation.

3. **Data Visualization**:

• Plotting geographical data (e.g., city coordinates) by reading data from files and creating visual maps using StdDraw.

4. **Function Plotting**:

• Visualizing mathematical functions (e.g., and ).

• Scaling canvas dimensions for accurate visualization and understanding potential complexities in data-driven visuals.

Both lectures focus on practical implementations and effective data processing techniques.