Dear Mr. Watchorn,

Executive Summary:

I hope this email finds you well. As per your instruction, I have completed the assignment using four equations in a MATLAB script. Please find below the discussion, outcomes, and conclusions of the test.

The MATLAB script consists of two matrices, a 2D dimensional map and a topological map of the Upper Peninsula snowfall for the 21-22 winter season. The script starts by defining the size of the matrices, creating them, and then populating them with data using the linspace and eye functions. The script also calculates the elapsed time taken to make the script.

Discussion:

I chose to document the script by including comments on each line of code to provide clarity and understanding of the logic behind it. The script is modular, as each part of the code performs a specific function that contributes to the overall outcome.

The style of the script is simple, concise, and adheres to the MATLAB coding standards. It uses appropriate variable naming conventions to ensure clarity and readability of the code.

Regarding the 2D dimensional map, I chose to create a matrix with all zeros and then add ones to the edges to enclose the map. Next, I added vertical, horizontal, and diagonal walls to the map to create obstacles. Finally, I placed the starting and ending points on the map. While this map is not based on any room, floor or site, it can be used by autonomous robots or vehicles to chart a path from the start position to the end position.

Regarding the topological map, I used the linspace function to create an array of values ranging from the lowest point to the highest point. Then, I defined the high and low points and used them to create the second highest, second lowest, and middle points. I used these points to create the transition between the low and middle points and between the second highest and middle points. Finally, I plotted the topographical map using the mesh function.

This took about 16 hours to create, though this includes sleeping overnight. Without sleeping this took about 6 hours to create.

Outcomes:

The 2D dimensional map and the topological map were generated without any errors, and the output is as expected.

Table

Description automatically generated with medium confidence

Figure 1: 2D Matrix

Chart, radar chart

Description automatically generated

Figure 2: Topological Map of Snowfall in the Upper Peninsula in the Winter 21-22 Season

Conclusions:

In conclusion, the MATLAB script successfully created two matrices, a 2D dimensional map, and a topological map of the Upper Peninsula snowfall for the 21-22 winter season. The script's modularity and documentation make it easy to understand and maintain. Based on the test outcomes, I can confidently say that the script behaves as expected.

Thank you for your time and consideration.

Sincerely,

Michael Dekoski