CSCI 4810/6810 (Summer 2020)
Programs 1 and 2 (Line Scan-Conversion) - 30 points

Due Date: July 3, 2020 (Friday, 11:59pm)

1. Write a function to draw a line using the Basic line drawing algorithm.
The following is a function header example:

Basic-alg (int x0, int y0, int x1, int y1)

Use this function to draw N lines (N is provided by the user) at positions (i.e., end coordinates) determined by a random number generator.

(10 points)

2. Write a function to draw a line using the "Bresenham" algorithm.
The following is a header example:

brz (int x0, int y0, int x1, int y1)

Use this function to draw N lines (N is provided by the user) at positions (i.e., end coordinates) determined by a random number generator.

(10 points)

3. **Report/Experiments:**
Provide some results (screen shots, …) in the report. Your mission in writing this report is to convince the reader that your programs work correctly. Experiment with your code – Time each of the above programs (1 & 2) (the critical parts only) and create a table of timings for each. Write up your concluding remarks based on your experiments. What impact does the length of lines have on performance? How about the number of lines? …
Provide a brief discussion as to how you would generate dashed lines (no need to program this); how about thick lines? …

(10 points)

NOTES:
Each of the line functions must handle all types of lines (horizontal, vertical, and all other line orientations); i.e., you need to generalize each of the algorithms that we discussed in class. Your programs must be readable, well engineered, and have relevant comments. Your programs together with your report should convince the Teaching Assistant (TA) that your code handles all types of lines and it works correctly.
See the next page for additional/important information.

SUBMISSION:

CSCI4810/6810 Teaching Assistant (TA) will be grading the assignments. His name is Mr. Fukun Liu. His email addresses are: fl79416@uga.edu and Fukun.Liu@uga.edu.
Fukun provided the following submission guidance:

Include your report, source programs, and all misc materials in a directory. Upload the directory to ELC for grading purposes (on ELC: go to Tools/Assignment/Assignment 1 to upload your directory).

The directory should include at least the followings:

1. Source Code(s)
2. A Video showing (demonstrating) the execution of Basic line drawing algorithm and the Bresenham's line drawing algorithm. You should demonstrate in the video that your line drawing algorithms can draw all types of lines (positive slopes, negative slopes, perfectly horizontal lines, perfectly vertical lines, …).
   You should also show that your algorithms/programs can draw the following lines (Assuming the format (int x0, int y0, int x1, int y1)):

   (10, 10, 30, 10)
   (10, 10, 10, 30)
   (30, 10, 10, 10)
   (10, 30, 10, 10)
   (10, 10, 20, 30)
   (10, 30, 20, 10)
   (20, 30, 10, 10)
   (20, 10, 10, 30)

3. Your report (in PDF) should also be included in the directory. Note that in order to study your codes and attempt to do a performance comparison, you should be timing the process of drawing many lines (ie, refer to N cited in the first page of this handout).

After you submit your assignment, Fukun may decide to contact some students (not all) in cases of questions.