Blake Savage
Assignment #2
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COSC 4345.001

1. Consider drawing a line from (1, 5) to (7, 9). What points would be plotted using the DDA algorithm? Show the steps.

m = (9-5)/(7-1) = *2/3* < *1*

Initial point: **(1, 5)**

$y_{k+1} = y_k + m = 5 + 2/3 = 5.66$

$x_{k+1} = 2$

(2, 5.66) —> **(2, 6)**

$y_{k+1} = 5.66 + 2/3 = 6.33$

$x_{k+1} = 3$

(3, 6.33) —> **(3, 7)**

$y_{k+1} = 6.33 + 2/3 = 6.99$

$x_{k+1} = 4$

(4, 6.99) —> **(4, 7)**

$y_{k+1} = 6.99 + 2/3 = 7.65$

$x_{k+1} = 5$

(5, 7.66) —> **(5, 7)**

$y_{k+1} = 7.66 + 2/3 = 8.33$

$x_{k+1} = 6$

(6, 8.33) —> **(6, 8)**

$y_{k+1} = 8.33 + 2/3 = 8.99$

$x_{k+1} = 7$

(7, 8.99) —> **(7, 9)**

2. Would a horizontal span or a vertical span be used to increase the line width of the above line? Why (explain your answer)?

A **vertical span**, because the slope is less than 1. A horizontal span would only appear to stretch the line.

3. Complete the following table for drawing the same line as in Problem #1 using Bresenham's Line Drawing Algorithm.

k	p_k	(x_{k+1}, y_{k+1})
0	2	(2, 6)
1	2 - 4 = -2	(3, 6)
2	-2 + 8 = 6	(4, 7)
3	6 - 4 = 2	(5, 8)
4	2 - 4 = -2	(6, 8)
5	-2 + 8 = 6	(7, 9)

4. Complete the following table for drawing a circle using the Midpoint Circle Drawing Algorithm with radius r=12 centered at the origin.

Initial point: (0, 12)

k	p_k	(x_{k+1}, y_{k+1})	$2x_{k+1}$	$2y_{k+1}$
0	1 – r = -11	(1, 12)	2	24
1	-11 + 2 + 1 = -8	(2, 12)	4	24
2	-8 + 5 + 1 = -2	(3, 12)	6	24
3	-2 + 6 + 1 = 5	(4, 11)	8	22
4	5 + 8 + 1 - 44 = -30	(5, 11)	10	22
5	-30 + 20 + 1 = -9	(6, 11)	12	22
6	-9 + 24 + 1 = 16	(7, 10)	14	20
7	16 + 28 + 1 - 40 = 5	(8, 9)	16	18
8	5 + 32 + 1 - 36 = 2	(9, 8)	18	16

Stop; x > y.