3. (a) Bresenham's line algorithm uses the decision parameter $P(k)$ for the k^{th} step of the method:

$$P(k) = 2\Delta y\ x(k) - 2\Delta x\ y(k) + K.$$

If the line goes between the end points (x_1, y_1) and (x_2, y_2):

i. Step-by-step, derive and expression for $P(k+1)$, and the constant K. [5]

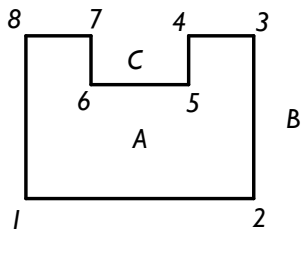
ii. What two values can $P(k+1)$ take and what does that mean for the algorithm? [3]

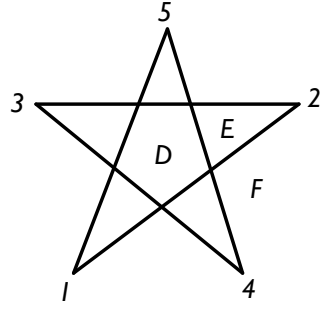
iii. What is the initial value of $P(k)$, and which values can be pre-calculated knowing only the endpoints of the line? [3]

iv. What conditions need to be imposed on the slope? How can arbitrary slopes be dealt with without sacrificing efficiency? [4]

(b) How could antialiasing be incorporated into Bresenham's line algorithm? [5]

(c) What are the winding-number values at locations A, B, C, D, E, and F for the following two polygons? (Vertices are numbered in the order they are drawn).





[5]