Question 2: Signature, Please!

Use the diagram on the right to sketch the signature of the contour on the left. It does not have to be perfectly scaled.

Start here and go counterclockwise.

Question 3: A Rectangle in Hough Space

Let us perform a Hough transform for the detection of straight lines as we discussed in class. Therefore, we are transforming the $x$-$y$ image space into an $\alpha$-$d$ space, representing the orientation and length of the normal. If our input image is the perfect rectangle with horizontal and vertical edges shown in the left figure, approximately what pattern of maxima would we expect in the transformed space (right figure)? Please describe how you computed your result.
Let us say that $0^\circ$ means pointing down, $90^\circ$ means pointing to the right, and so on. The bottom edge of the rectangle passes through the origin, so the length $d$ of the normal is 0, and its orientation is either up or down, so we could pick $0^\circ$ or $180^\circ$; either one is correct. Let’s pick $0^\circ$.

For the top edge, the normal points up ($180^\circ$) and has a certain distance $d$. The left and right edges have normals that point to the right ($90^\circ$) with different values of $d$, both of which are smaller than that for the top edge.

**Question 4: Slope Density Functions**

(a) Draw the slope density function of the following contour:

If we go counterclockwise around the contour, we have two smaller segments of 0 and 270 degrees and three larger ones at 45, 135, and 225 degrees:
(b) Describe how this function changes if you rotate the contour clockwise by 90 degrees. You can describe it in words or draw another diagram.

Because angles grow in counterclockwise direction, a 90 degree clockwise rotation shifts all peaks in the diagram to the left (smaller values) by 90 degrees. Values below 0 degrees of course move back into the diagram on the right hand side: