The purpose of MP2 is implementing five different morphological operators: erosion, dilation, opening, closing, and boundary.

Erosion: The erosion of the binary image *A* by the structuring element *B*

$A \Theta B = \{z | B_z \subseteq = A|\}$, where B_z is the translation of *B* by the vector z.

Dilation:
The dilation can also be obtained by $A \oplus B = \{z|(\hat{B})_z \cap A \mathrel{!}= \varphi\}$, where $\hat{B}$ denotes the reflection of *B*.

Opening:

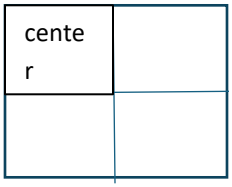
Erosion binary image *A* by the structuring element *B* to get a binary image C, and then obtain the dilation of image C by $C \oplus B$.

Closing:

Obtain the dilation of image A by $A \oplus B$ to get image C, and then erosion binary image C by the structuring element *B* to get the result.

Boundary:
First, use the closing operator to get a new image A with no noise. Then get the erosion of the binary image, C. Image A would be larger than image C, so C minus A can get the boundary.

For structuring elements, I use an array to represent them. For example, [0,1,0,1] means for the center of this structuring element there is no element on the left, one line of elements on the right, no element on the top, one line of elements on the bottom. So, this structuring element is 2*2.



This graph shows how [0,1,0,1] looks like.

Final Result:

For each of these five morphological operators, I tried different structure elements to get a better result. The final result is I am able to get a clear boundary of both test cases.