Homework 4

For part (a) to (d) the mask is the octogonal 3-5-5-5-3 kernel.

(a)

The function `dilation(img, mask)` takes 2 arguments. The first argument is a binary image. The second argument is a n by 2 array indicating the mask used, and each element is a coordinate from the origin of the mask.

To dilate the image, for each pixel (r, c), if intensity(r, c) == 255, then for (z, t) in mask, if (r + z, c + t) is inside the boundary, set intensity(r + z, c + t) in new image to 255, otherwise, set to 0.

(b)

The function `erosion(img, mask)` takes same kinds of arguments as `dilation(img, mask)`.

To erode the image, for each pixel (r, c), for (z, t) in mask, if (r + z, c + t) is not inside boundary or intensity(r + z, c + t) == 0, then set intensity(r, c) in new image to 0, otherwise, set to 255.

(c)

Opening is done by calling `dilation(img, mask)` on the eroded image of part (b)

(d)

Closing is done by calling `erosion(img, mask)` on the dilated image of part (a)

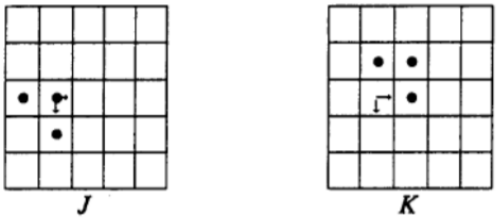
(e)

The function `complement(img)` takes a binary image as argument.
To find the complement, for each pixel (r, c), if intensity(r, c) == 0, set it to 255, otherwise, set to 0.

The function `intersection(img1, img2)` takes two binary images with the same shape as arguments.
To find the intersection, for pixels at position (r, c), if img1(r, c) == 255 and img2(r, c) == 255, then set the intensity(r, c) to 255 in the image of intersection, otherwise, set to 0.

The function `hit_and_miss(img)` takes a binary image as argument
Two "L" shaped kernel are set as following.

```
J = [(0, -1), (0, 0), (1, 0)]
K = [(-1, 0), (-1, 1), (0, 1)]
```



Find two image,

```
img_J = erosion(img, J)
img_K = erosion(complement(img), K)
```

Then, the final result of hit-and-miss is `intersection(img_J, img_K)`.