1. **Morphological Operations**: Draw in (b) below the result of the union of the erosion of the image in (a) by each of the structural elements listed below. You may use other blank templates for your intermediate work. (25 pts)

   \[ L_1 = \{(0, 0), (1, 0)\} \quad L_2 = \{(0, 0), (1, -1)\} \]

   \[ L_3 = \{(0, -1), (1, 0)\} \quad L_4 = \{(0, 0), (0, -1)\} \]
2. Derive the form of the optimal linear filter that restores a step edge in i.i.d. white noise in the minimum total squared error sense? (15 pts)
3. What is the shape of the voting region in the Hough space for a circle, when in addition to the location of a point on the circle we also have an estimate of the tangent to the circle at that point? (25 pts)
4. If the response of a linear shift invariant system to a step function is given by $e^{-ax}$, what is the impulse response of the system? (15 pts)
5. What is Weber’s Law? (5 pts)

6. Draw of the frequency domain plot of the Lateral Inhibition Filter in our eyes? (5 pts)

7. What is the Mach band effect? (5 pts)

8. All colors can be formed by mixing one set of three primary colors, e.g. red, green, and blue. True or False? Explain. (5 pts)