Northwestern University
Electrical Engineering and Computer Science
EECS357 Introduction to VLSI CAD
Prof. Hai Zhou

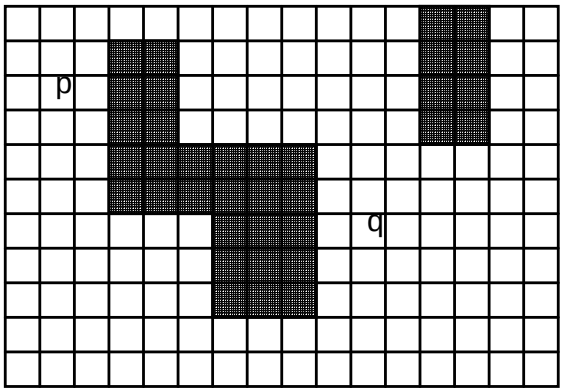
Mar 6, 2014
Handout #10
Due: Mar 13

Homework 5

You may discuss the assignments with your classmates but need to write down your solutions independently. Be careful with your handwriting. Unclear solutions will be assumed to be wrong.

1. (20 points) Prove that the uniqueness property is also held in each of the octant regions in Zhou's work when Euclidean distance is used, that is, for any two points (x_1, y_1) and (x_2, y_2) that are in the same region w.r.t. (x, y), we have
$$\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2} < \max\left(\sqrt{(x - x_1)^2 + (y - y_1)^2}, \sqrt{(x - x_2)^2 + (y - y_2)^2}\right)$$

2. (20 points) Use maze routing with labeling sequence $11221122\cdots$ to find a route between pin p and pin q in the following graph. What is the worst case running time of such an algorithm?



3. (20 points) What is the running time of Lee's maze router when there is only one two-terminal net in an $n \times n$ grid and the rectilinear distance between the two terminals is d? For what configuration of obstacles is the running time independent of n and depends only on d?

4. (20 points) Exercise 5.23 on page 273 of the text.

5. (20 points) Construct the horizontal constraint graph and vertical constraint graph for the following channel routing problem. Then use the constrained left-edge algorithm to find a solution for it.