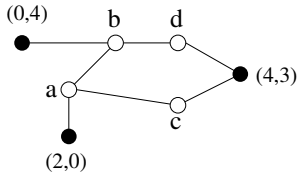
Exercises on physical design

1 Quadratic placement

Apply quadratic placement to find the optimal location of the nodes of the following graph in order to minimize the the squared Euclidean distance of the connected nodes. The graph has some nodes with fixed locations in which the (x, y) coordinates are specified.



To solve the problem describe the following steps:

- Show the two linear system of equations for the x and y coordinates.
- Solve the systems of equations and draw the final solution in a 2D plot.

To solve the system of equations you can use any web solver. For example, select the matrix method in:

`http://wims.unice.fr/wims/en_tool~linear~linsolver.html`

2 Channel routing

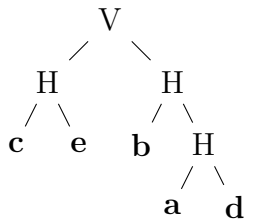
Given a channel with the following pin connections:

```
TOP = [A B C A D E B E F G K]
BOT = [A D C E F K G J H H J]
```

- Draw the vertical constraint graph without splitting the nets.
- Determine the zone representation for the nets.
- Draw the vertical constraint graph with net splitting.
- Find the minimum number of required tracks with net splitting and without net splitting.
- Use the Dogleg Left-Edge algorithm to route this channel. For each track, state which nets are assigned. Draw the final routed channel.

3 Slicing floorplan

Consider the floorplan tree shown in the figure and the dimensions of the blocks shown in the table:



	height	**width**
a	2	3
b	3	4
c	2	5
d	2	3
e	3	3

1. Find the smallest bounding box that can accommodate the slicing floorplan assuming that blocks can be rotated by 90^o. Show the shape functions at each node of the tree and the final floorplan.
2. Find another slicing tree that can give a smaller floorplan. Draw the new floorplan.