22C:002 Algorithms: From Euclid to the iPad
Homework 4 Due: 10-6, Th, in-class

Play with the animation that shows algorothms for maze construction and solving mazes at `http://www.cut-the-knot.org/ctk/Mazes.shtml`. Then answer the following questions.

1. Start with a 4×4 grid and use the animation to construct a spanning tree. Draw the grid and the constructed spanning tree (let us call this T). Recall that before the spanning tree T is constructed, weights are assigned at random to the edges of the grid. Suppose that the weights assigned are integers between 1 and 100. Come up with an assignment of weights to the edges of the grid so that T is the spanning tree that is constructed.

2. Is there an assignment of weights to edges in which an edge left out of the spanning tree has weight smaller than that of an edge included in the spanning tree? If so, show such an assignment of weights. Otherwise, explain why this is not possible.

3. Show how *breadth-first search* (BFS) would work to solve this maze. Some combination of pictures and text would be needed for your solution. Is the path discovered by BFS shorter than the path discovered by the depth-first search algorithm used in the animation? If not construct other mazes (using 4×4 grids) for which this true.