# Mandatory Exercise: Approximation Algorithms 2

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**1 Placement of distribution centers**  You are consulting for a transport company that distributes goods from their distribution centers. The company uses bikes to deliver their packages. They are going to start up in a new area, and wants to know where to place their distribution centers. The map of the area is given as a graph $G = (V, E)$ with $n$ nodes and distance function $d$, which is a metric. They want to build distribution centers such that the maximum distance from a vertex to its closest distribution center is minimized (in order to make sure the bike riders do not have to go to far away from the distribution center). But some places are more expensive than others. For each vertex $v$ in the graph there is a price $p_v$ that indicates how much it costs to place a distribution center at vertex $v$. The company have a budget of $W$ for building their distribution centers.

Give a 3-approximation algorithm for the problem.
**Note:** You may assume you know the optimum covering radius.