E problem 1

Whitney decomposition: Show that any open set $\Omega \subset \mathbb{R}^d$ can be written as the union of dyadic cubes, so that $\Omega = \cup Q_j$, with the following properties.

1. The $Q_j's$ have disjoint interiors.
2. $d(Q_j, \Omega^c) \sim \ell(Q_j)$, where $\ell(Q_j)$ is the side length of Q_j. This means that there are positive constants c and C so that

$$c\ell(Q_j) \leq d(Q_j, \Omega^c) \leq C\ell(Q_j).$$