

Seminar on Algorithms and Geometry 2014B – Problem Set 3

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May 15, 2014

We discussed in class low-distortion metric embeddings, and in particular a probabilistic embedding into dominating trees.

1. Prove that every finite tree metric embeds isometrically into ℓ_1 . For simplicity, you may restrict attention to (the shortest-path metric of) an *unweighted* tree $T = (V, E)$.

Hint: Use one coordinate for each edge $e \in E$, and think first about a star graph.

2. Prove that every n -point metric space (X, d) embeds into ℓ_1 with distortion $O(\log n)$.

Hint: Use a probabilistic embedding into dominating trees (you may assume that the probabilistic embedding has finite support).