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Question Sheet
Quiz 5 for Dec 07, 2021

Which is the correct answer?

Question 1:

How many of the following are important differences between the approach by Golin et al. and the one by Bentley and Shamos?
(A) Probabilistic runtime instead of deterministic runtime. (B) Arguably better runtime. (C) No recursion, so corner cases require less care. (D) Relatively easy to generalize to higher dimensions.

- 0

- 1

- 2

- 3

- 4

Question 2:

Consider a grid cell G_δ of size δ in two dimensions. What is the total area of all potential locations that are at distance less than δ of some point $p \in G_\delta$?

- δ^2

- $\pi\delta^2$

- $(5 + \pi)\delta^2$

- $9\delta^2$

Question 3:

Suppose the order of points is given by some random permutation. What is the expected time for rebuilding the grid in step i?

- $E[T_{\text{build}}(i)]$

- $\frac{2}{i}E[T_{\text{build}}(i)]$

- $\frac{2}{i}$

Question 4:

What is the most critical modification for using the algorithm by Golin et al. in d instead of in 2 dimensions without changing the expected time complexity?

- Consider the different dimensions consecutively.

- Use recursion for iteratively bringing down the dimension.

- Consider neighborhoods consisting of 3^d grid cells instead of 9.

- Adjust the involved probabilities.

- Use a recursive search tree/hash table to accomodate d dimensions.