

D: Dragon Balls

Problem Author: Paul Wild



Problem

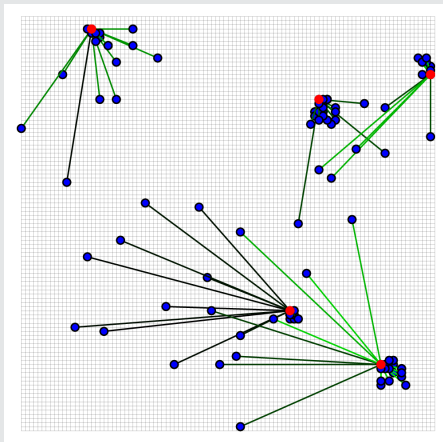
Find the seven Dragon Balls in the 2D plane. A radar interactively tells you the distances from query points to the closest balls. Balls disappear once found. You may use the radar at most 1 000 times.

D: Dragon Balls

Problem Author: Paul Wild

Solution Type 1 – Local Search

Pick a random starting point and home in on one of the balls. Repeat.



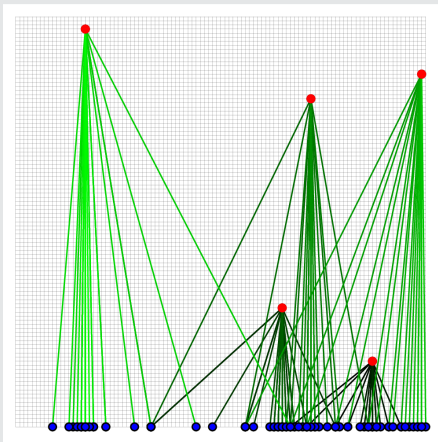
D: Dragon Balls

Problem Author: Paul Wild



Solution Type 2 – Search Space Partitioning

Use some kind of binary search / ternary search / quadtree.



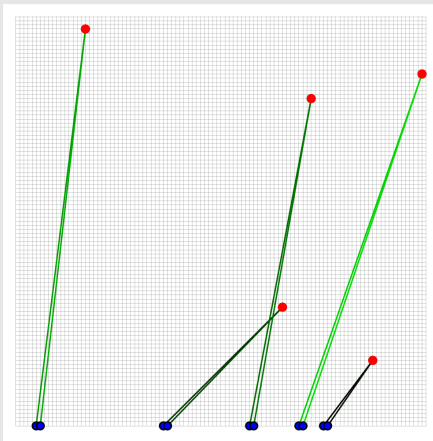
D: Dragon Balls

Problem Author: Paul Wild



Solution Type 3 – Circle Intersections

Any two adjacent points will have the same closest ball with high probability. Query the two points, then query the intersection point of the two circles.



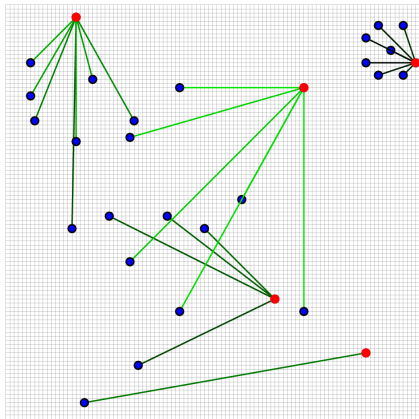
D: Dragon Balls

Problem Author: Paul Wild



Solution Type 4 – Sum of Squares

Query a random point. Then try all integer points at the given distance.



D: Dragon Balls

Problem Author: Paul Wild



Gotchas

- Asking more queries after all balls have been found.

Statistics: 337 submissions, 70 + ? accepted