

MA251 Data Structures Lab

Jul - Nov 2021

Assignment 5

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1. Write a program that prints out all integers of the form $a^3 + b^3$ where a and b are integers between 0 and n in sorted order, without using excessive space. That is, instead of computing an array of the n^2 sums and sorting them, build a minimum-oriented priority queue, initially containing $(0^3, 0, 0), (1^3, 1, 0), (2^3, 2, 0), \dots, (n^3, n, 0)$. Then, while the priority queue is nonempty, remove the smallest item $(i^3 + j^3, i, j)$, print it, and then, if $j < n$, insert the item $(i^3 + (j+1)^3, i, j+1)$. Use this program to find all distinct integers a, b, c , and d between 0 and 10^6 such that $a^3 + b^3 = c^3 + d^3$, e.g., $1729 = 9^3 + 10^3 = 1^3 + 12^3$.
 2. Find all solutions to the equation $a + 2b^2 = 3c^3 + 4d^4$ for which a, b, c , and d are less than 100,000. Hint: use one min heap and one max heap.