# Data Structures: Programming Homework 4

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# PHW 4-1: Hand-Tracing k-d tree code (10 points)

- Use the following source code for k-d tree
  - https://rosettacode.org/wiki/K-d_tree
- Hand-trace the source code for
  - inserting the first three of the 6 input points used in the source code
    - (ignore the "find_median" function – except for the call and return from the function; compute the median by hand)
  - call of the nearest function (including the input parameters and output parameters)

# PHW 4-2: Pseudocode (30 points)

- Write an algorithm in pseudocode form for each of the following functions: (include the function header)
- (1) point_search for a user-specified point
- (2) range_search (find all points contained within a specified bounding rectangle)
- (3) nearest_neighbor_search (given a point, find one or more nearest neighbor points)

# PHW 4-3: Implementation (60 points)

- Using the source code provided as basis, implement the algorithms developed in PHW 4-2.
- (1) point_search for a user-specified point
- (2) range_search (find all points contained within a specified bounding rectangle)
- (3) nearest_neighbor_search (given a point, find one or more nearest neighbor points)

# PHW 4-3: Specification

- Assume a 10 x 10 grid.
- Insert the following points in order:
  - (2,3), (5,4), (3,4), (9,6), (4,7), (8,1), (7,2)
- Test the point_search function, by searching for the following points and displaying the results.
  - (5,4), (4,7), (10,5)
- To test the range_search function, specify a rectangle with (left x=6, left y=3), width 3,height 4.
- Test the nearest_neighbor_search function twice: first with input (5,4); then with input (4,7)