Friday July 12th 2024.

CS240 Tutorial 10

1. **Range Trees**
   Consider a range tree which stores the points
   $(2, 12), (17, 77), (23, 92), (40, 47), (55, 91), (67, 27), (89, 79), (99, 53), (10, 23)$
   Draw the primary-structure associated with these points. Draw the associated structure for the point $(67, 27)$

2. **Kd-tree Construction**
   Give an algorithm to construct a kd-tree in worst case $\Theta(n \log(n))$ time.

3. **Karp-Rabin**
   For Karp-Rabin pattern matching, consider the following rolling hash function

$$h(p) = (\#\text{ occurrences A}) + 2(\#\text{ occurrences of C})$$
$$+3(\#\text{ occurences G}) + 4(\#\text{ occurences of T})$$

   Given the pattern $P = \text{TAGCAT}$ and the text $T = \text{TGCCGATGTAGCTAGCAT}$ show all the character comparisons performed during Karp-Rabin pattern matching.