



[Name / ID]: _____

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1. [6 point] Consider a hash function $h(x) = x \% 7$. Create a treap for the above table where x is the value and $h(x)$ is the priority. Create a separate tree for each element and show the intermediate steps.

x	5	17	33	18	132	23
$h(x)$	5	3	5	4	6	2

2. [9 points] Insert the above values in a hash table with backing array of 2. Use linear probing to resolve collisions. The maximum load factor is 0.75 i.e. the table should be resize if adding new element fill the more than 75% of the capacity. The new size of the backing array should be $2N$ where N is the number of elements in the hash table (excluding the new element).
3. [5 points] If we remove a key from treap and reinsert it immediately afterwards, will the treap structure change or not? Provide brief argument to justify your answer.



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4. [6 point] Consider a hash function $h(x) = x \% 7$. Create a treap for the above table where x is the value and $h(x)$ is the priority. Create a separate tree for each element and show the intermediate steps.

x	17	11	121	22	33	16
h(x)	3	4	2	1	5	2

5. [9 points] Insert the above values in a hash table with backing array of 2. Use linear probing to resolve collisions. The maximum load factor is 0.75 i.e. the table should be resize if adding new element fill the more than 75% of the capacity. The new size of the backing array should be $2N$ where N is the number of elements in the hash table (excluding the new element).
6. [5 points] If we remove a key from treap and reinsert it immediately afterwards, will the treap structure change or not? Provide brief argument to justify your answer.