1. Build a skiplist for the given following numbers to be entered (in the given order) in an initially empty skiplist.

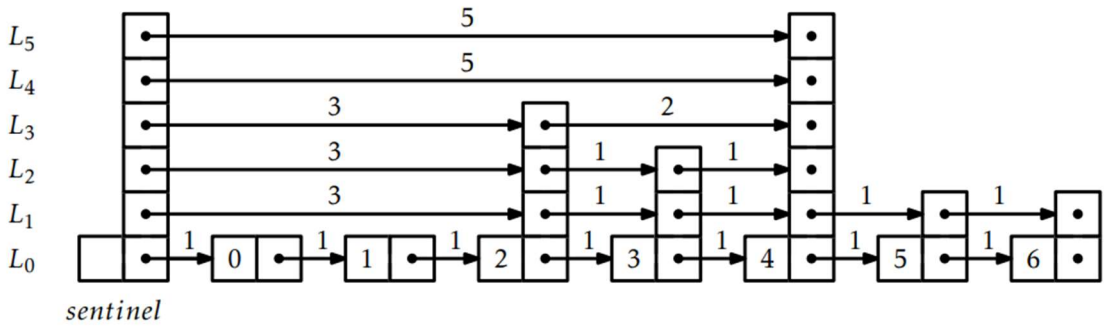
   10 4 18 5 11 7 3 1 15

   The outcome of a series of coin tosses is sampled below. You will keep entering new nodes to upper levels until you get Head (H). [for example, the height of first node will be 3]

H	H	H	T	H	T	T	H	H	T
H	H	T	T	T	T	H	H	H	H
T	H	H	T	H	T	T	H	H	T
H	H	H	T	H	T	H	H	H	H

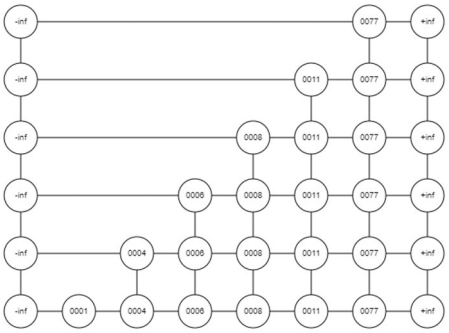
2. [10 points] Instead of using a fair coin, we decided to use an unfair coin with 3/4 probability to **tail**, to decide the height of a new node in a Skiplist. What would be the impact of height compared to if we use fair coin? Will it increase or decrease?

1. [5 points] Illustrate the execution of remove(2) on the following SkiplistList.



2. [5 points] Suppose that, instead of promoting an element from L_{i-1} into L_i based on a coin toss, we promote it with some probability $p, 0 < p < 1$. What would be the number of nodes at any level r for such skiplist?

3. Suppose that, instead of promoting an element from L_{i-1} into L_i based on a probability, we decide the height on the basis of the index of the elements i.e. the height of an element should be equal to i where i is the index of the element (see the figure). This height should also be maintained when a new element is added or removed.



   a. [3 points] What would be the maximum height of skiplist?

   b. [7 points] Can we still achieve the finding an element in $O(\log n)$? Provide brief argument for your answer.