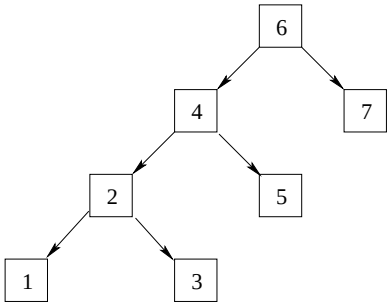
CS 2123
Data Structures
Bonus Assignment
Due Friday April 29

1. (100 pts) Write a program to randomly pick an element of a binary search tree randomly. All the elements should have about equal probability of being selected. Consider the following binary search tree as an example.



If you simulate flipping a coin and choose left or right based on the outcome, node 7 will be selected 50% of the time. We want the probability of node 7 to be selected to be 1/7. Note that the elements in the tree need not be consecutively numbered. There may be gaps between the numbers. Don't assume anything about individual numbers. Just read the numbers from the user as shown below and use your proposed scheme to estimate the probabilities.

```
fox01>assignbonus
Enter the set of numbers for the tree
60 41 72 23 57 1 32
Probabilities after 1000 random selections are
p(60) = 0.135000
p(41) = 0.135000
p(72) = 0.152000
p(23) = 0.147000
p(57) = 0.156000
p(1)  = 0.147000
p(32) = 0.128000
```

Insert the numbers into the trees in the order they are listed. Once you build the tree, pick a random element 1000 times and estimate and print the probabilities

Submit your program electronically using the blackboard system

The program you submit should be your own work. Cheating will be reported to office of academic integrity. Both the copier and copiee will be held responsible.