[100] **Project 1**: *Construction of a Heap*

Due: March 31 by midnight.

Define a heap as follows:

```
struct heap {
              int size;
              struct tnode *top ;
              }
 struct tnode {
              struct tnode *left;
              struct tnode *right;
              struct tnode *parent;
              int value;
              }
```

Description: Above, size refers to the number of elements in the heap, and top points to the root of the heap. Furthermore, each cell has three pointers, a parent pointer, and two child pointers. The parent of the root is NIL, by convention.

You are asked to do the following:

- Generate randomly 200 numbers from the interval [1..1000]. Write a program that heapify this numbers. Your algorithm should be of $O(n \log n)$ complexity, where n is the size of input.
- After creating a heap, print:

  [20] the value of the top of the heap,

  [60] the value of the last element of the heap.

Notes:

1. To generate random numbers use the uniform generator provided on the back of this page which will generate for you a random number U from the interval $[0, 1)$. You should set the *initial* seed value to `iseed=987654321`. To get random number V from the interval [1..1000] do
$$V = \lfloor U * 1000 \rfloor + 1 \ .$$
2. To turn in the project write

   `turnin -c cs251_10:30 -p project1` filenames

   `turnin -c cs251_1:30 -p project1` filenames

   whichever applies.