Discrete Mathematics

Homework 5: Python

Due 2:20 pm, May 25, 2011

Note: You must submit your homework to the TA by e-mail. Put all your python programs in a file named after your student ID. As an example, the student with ID *B99705001* must submit only one file with name `B99705001.py` to the TA. In the file, there are five python functions which you need to define. The names of the five functions are `rev1`, `height`, `mirror`, `insert`, and `list2bst`.

1. Complete the following function `rev1(x)` so that it will be a reverse function for lists.

```
def rev1(x):
    if len(x) == 0:
        return ___________________
    else:
        k = len(x) - 1
        u, v = x[0:k], x[k]
        return ___________________
```

2. Complete the following function `height(x)` so that it will return the height of the tree x.

```
def height(x):
    if len(x) == 0:
        return ___________________
    else:
        left, root, right = x
        return ___________________
```

   As an example, `height(this)` will return 2, while `height(that)` will return 0, for the following two trees.

```
this = (((), "clueless", ()), "complexify", ())
that = ()
```

3. Define a function `mirror(x)` so that it returns the mirror image of the tree x (without destroying x). As an example, `mirror(this)` will return

```
((), "complexify", ((), "clueless", ()))
```

4. Define a function `insert(t, x)` so that, given a binary search tree x and an element t, it returns a new binary search tree including all the elements already in x as well as t. Note: do not destroy the tree x. As an example, the following code

```
print insert("jazzed", this)
print this
```

   will output

```
(((), "clueless", ()), "complexify", ((), "jazzed", ()))
(((), "clueless", ()), "complexify", ())
```

5. Use the function `insert` above, define a function `list2bst(x)` so that it returns a binary search tree with elements from the list x. Note that repeating elements in x shall not appear more than once in the binary search tree. As an example,

```
print list2bst(["clueless", "clueless"])
```

   will output

```
((), "clueless", ())
```

PLEASE NOTE, NO EXCEPTION

- Homework is due **before the class begins** on May 25, 2011. Late homework will not be accepted.
- Do the homework by yourself. Discussion among peers is encouraged but **copying from others is a shame**.