Project:	Write a program that reads integers, stores them into a B-Tree of order **3**, prints the tree, and prints a sorted list of identifiers.

Program Files:

File	Description
p04.cpp	File **p04.cpp** contains functions that process command line arguments and exercises **class** *BTree*.
***04.h**	All files containing class definitions must have the suffix **04.h**.
***04.cpp**	All files containing member function implementations must have the suffix **04.cpp**.
p04make	File **p04make** contains instructions for program **p04**. Instructions are written for the UNIX utility *make*. Program **p04** is contained in file **p04**.

Command Line:	Project **4** can be invoked with zero, one, or two program parameters. The first program parameter is the input file name. The second parameter is the output file name. Sample command lines together with corresponding actions by program **p04** are shown below. Boldfaced type indicates data entered at the keyboard by the user.

$ **p04**
Enter the input file name: **i04.dat**
Enter the output file name: **o04.dat**

$ **p04 i04.dat**
Enter the output file name: **o04.dat**

$ **p04 i04.dat o04.dat**

Input Files:	File **i04.dat** contains a list of positive integers (see Figure 1.). A representative list of integers is contained in file **~tt/cs3613/i04.dat** which you may copy to your home directory for testing purposes.
Output File:	Program **p04** reads an integer key, inserts it into a B-Tree, and prints a representation of the tree after each integer is inserted. Note that the integer about to be inserted is printed just before the B-Tree is printed. B-Trees are printed using a preorder traversal. Keys in interior nodes of the B-Tree are enclosed in parentheses and separated by colons (:). Keys in the leaves of the tree are enclosed in square brackets and separated by commas. Empty positions for keys in a node that is not completely filled are represented by underscores. Nodes in the B-Tree are indented according to the depth of the node. The root is not indented. Each level is indented five spaces more than the previous level. Figure 2 shows the output produced by program **p04** given the list of integers in Figure 1.

```
22 16 41 11 18 28 58 1 8 12 17 19 23 31 52 59 61
```

Figure 1. Format of the input

```
Insert key 22:
[22,_,_]

Insert key 16:
[16,22,_]

Insert key 41:
[16,22,41]

Insert key 11:
(22:_}
   [11,16,_]
   [22,41,_]

Insert key 18:
(22:_)
   [11,16,18]
   [22,41,_]

Insert key 28:
(22:_)
   [11,16,18]
   [22,28,41]

Insert key 58:
(22:41)
   [11,16,18]
   [22,28,_]
   [41,58,_]

Insert key 1:
(22:_)
   (16:_)
      [1,11,_]
      [16,18,_]
   (41:_)
      [22,28,_]
      [41,58,_]
```

Figure 2. Output file format

```
Insert key 8:
(22:_)
   (16:_)
      [1,8,11]
      [16,18,_]
   (41:_)
      [22,28,_]
      [41,58,_]

Insert key 12:
(22:_)
   (11:16)
      [1,8,_]
      [11,12,_]
      [16,18,_]
   (41:_)
      [22,28,_]
      [41,58,_]

Insert key 17:
(22:_)
   (11:16)
      [1,8,_]
      [11,12,_]
      [16,17,18]
   (41:_)
      [22,28,_]
      [41,58,_]

Insert key 19:
(16:22)
   (11:_)
      [1,8,_]
      [11,12,_]
   (18:_)
      [16,17,_]
      [18,19,_]
   (41:_)
      [22,28,_]
      [41,58,_]

Insert key 23:
(16:22)
   (11:_)
      [1,8,_]
      [11,12,_]
   (18:_)
      [16,17,_]
      [18,19,_]
   (41:_)
      [22,23,28]
      [41,58,_]
```

Figure 2. Output file format (continued)

```
Insert key 23:
(16:22)
   (11:_)
      [1,8,_]
      [11,12,_]
   (18:_)
      [16,17,_]
      [18,19,_]
   (41:_)
      [22,23,28]
      [41,58,_]

Insert key 31:
(16:22)
   (11:_)
      [1,8,_]
      [11,12,_]
   (18:_)
      [16,17,_]
      [18,19,_]
   (28:41)
      [22,23,_]
      [28,31,_]
      [41,58,_]

Insert key 52:
(16:22)
   (11:_)
      [1,8,_]
      [11,12,_]
   (18:_)
      [16,17,_]
      [18,19,_]
   (28:41)
      [22,23,_]
      [28,31,_]
      [41,52,58]
```

Figure 2. Output file format (continued)

```
Insert key 59:
(22:_)
   (16:_)
      (11:_)
         [1,8,_]
         [11,12,_]
      (18:_)
         [16,17,_]
         [18,19,_]
   (41:_)
      (28:_)
         [22,23,_]
         [28,31,_]
      (58:_)
         [41,52,_]
         [58,59,_]

Insert key 61:
(22:_)
   (16:_)
      (11:_)
         [1,8,_]
         [11,12,_]
      (18:_)
         [16,17,_]
         [18,19,_]
   (41:_)
      (28:_)
         [22,23,_]
         [28,31,_]
      (58:_)
         [41,52,_]
         [58,59,61]
```

Figure 2. Output file format (continued)