Exercises 4

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5.6

```cpp
template <class Key, class Elem, class KEComp>
bool search(BinNode<Elem>* node, Key K) {
    if (node == NULL) return false;
    if (node->value() == K) return true;
    if (search(node->left())) return true;
    return search(node->right());
}
```

5.19

```cpp
template <class Key, class Elem, class KEComp>
int smallcount(BinNode<Elem>* node, Key K) {
    if (node == NULL) return 0;
    if (KEComp.gt(node->value(), K)) return smallcount(node->leftchild()
    , K);
    else return smallcount(node->leftchild(), K) + smallcount(node->
    rightchild(), K) + 1;
}
```

5.27

```cpp
template<typename E> class heap{
    private:
        E* Heap;
        int maxsize;
        int n;
        void shiftdown(int pos){
            int j, tmp;
            tmp = Heap[pos];
```

```cpp
            j = 2 * pos + 1;
            while(j < n){
                if(j+1 < n&&Heap[j+1] < Heap[j]) ++j;
                if(Heap[j] >= tmp)
                    break;
                Heap[pos] = Heap[j];
                pos = j;
                j = 2*pos + 1;
            }
            Heap[pos] = tmp;
        }
    public:
        void removeMin(){
            swap(Heap[0],Heap[--n]);
            shiftdown(0);
        }
}
```

5.28

l 00

h 010

i 011

e 1000

f 1001

j 101

d 11000

a 1100100

b 1100101

c 110011

g 1101

k 111

The average code length is 3.23445