CSE1502 Spring 2007 Final exam, open book, open notes. Name _____

1. What does the following print? (2 pts each)?

```
int i=5, j=5, k=5;              ANSWERS
cout << 3.2 / 2 / 2;            0.8
cout << i++ + j / 2;            7
if (j = 3) cout << j;           3
cout << int(true || false);     1

string s="ABCDE";
cout << s.substr(1, 2);         BC
cout << s[1];                   B
cout << char('k' + 2);          m
cout << int((s + "8").size()); 6
```

2. What does this print? (4 pts)

```
for (int i=3; i%8; i*=2)
  cout << i << " ";
```

ANSWER: 3 6 12

3. In the code below, read(v) reads a list of numbers from the user ending with 0 and appends them to the vector<int> v, not including the 0. The function remove_odd(v) removes the odd elements of v. firstpos(v) returns the first element greater than 0, or returns 0 if no such element exist. For example, in the code below, if the user enters **5 6 7 8 9 0** then the output is **6**. Write the 3 functions (10 pts each).

```
vector<int> v(3);    // 0 0 0
read(v);             // 0 0 0 5 6 7 8 9
remove_odd(v);       // 0 0 0 6 8
cout << firstpos(v); // 6
```

```
// ANSWERS
void read(vector<int>& v) {
  int x;
  while (cin >> x && x != 0)
    v.push_back(x);
}

void remove_odd(vector<int>& v) {
  // copy even elements of v
  vector<int> even;
  for (int i=0; i<int(v.size()); ++i)
    if (v[i]%2 == 0)
      even.push_back(v[i]);
  v = even;
}

int firstpos(const vector<int>& v) {
  for (int i=0; i<int(v.size()); ++i)
    if (v[i] > 0)
      return v[i];
  return 0;
}
```

4. Class **Set** represents a set of strings. If s is a set, then s.add(x) adds string x to the set, and s.in(x) returns true if x is in the set. For example,

```
Set s;
s.add("cat");
s.add("dog");
if (s.in("dog")) // true
  cout << "dog is in s\n";
if (s.in("bird"))  // false
```

A set is represented as a `map<string, bool>` where the keys are the elements of the set, and the values are all **true**. The class is given below. Write the 2 member functions (10 pts each).

```
class Set {
public:
  void add(const string& s);
  bool in(const string& s);
private:
  map<string, bool> m;
};
```

```
// ANSWERS
void Set::add(const string& s) {
  m[s] = true;
}

bool Set::in(const string& s) {
  return m.find(s) != m.end();
  // or return m[s];
}
```

5. Write a program `letters.cpp` that takes a filename on the command line and prints the number of letters (a-z, A-Z) in the file. It should print 0 if either the filename or file is missing. For example, if `file1.txt` contains "This is a test!" then (30 pts)

```
letters file1.txt
11
letters
0
```

```
// ANSWER
#include <iostream>  // cout
#include <fstream>   // ifstream
#include <cctype>    // isalpha()
using namespace std;
int main(int argc, char **argv) {
  int count = 0;     // count of letters
  if (argc > 1) {    // filename exists?
    ifstream in(argv[1]);
    if (in) {        // file exists?
      char c;
      while (in.get(c))
        if (isalpha(c))
          ++count;
    }
  }
  cout << count << "\n";
  return 0;
}
```