**CS 201 Final Exam**

**Control Structures**

1) How many times does this code print “Hi”?

 for(int i = 0; i < 10; i++)

 for(j = 0; j < 5; j++)

 cout << “Hi”;

2) What does this code print? Be careful.

 int grade = 92;

 if (grade > 60)

 cout << “D” << endl;

 if (grade > 70)

 cout << “C” << endl;

 if (grade > 80)

 cout << “B” << endl;

 else

 cout << “A” << endl;

3) What does this code print?

int thing(int a) {

 if (a > 5)

 return thing(a-1);

 else

 return a-1;

}

cout << thing(7) << endl;

**Files**

1) Finish the code below. When done, the output file should contain only the word “Bye”. Hint: This is super easy, don’t overthink this.

void testFunction() {

 ofstream fred(“output.txt”);

 fred.close();

}

2) What does the seekg() function do? (Pick one)

 find a file in the file system. It returns a directory.

 tell you the size of the file. It returns a number.

 None of these stupid answers!

**Pointers**

1) What does the code below print out?
 int \*a, b, \*c, d;

 a = &b;

 \*a = 12;

 c = &b;

 \*c = 14;

 cout << \*a;

2) Which of these groups of lines will compile? (Choose zero or more)

 int a, \*b; int a, \*b; int a, \*b; int a, \*b;

 a = &b; a = b; b = &a; b = \*a;

3) What type is the following expression? The variable ‘p’ is a pointer to float. Pick one.

 float

 int

 pointer-to-float

 pointer-to-int

 The expression is illegal

  *\*(p+3)* ← this expression here

**Linked List and Objects**

1 and 2) Suppose I have a whole linked list of Nodes as shown below. The first Node is called ‘head’. Write a loop that prints “Yes” if any node is named “Ace” and “No” if there is not one Node named “Ace”. Your code should only print ONE line.

class Node {

 public:

 string name;

 Node \*next;

 };

Node \*head;

**Operator Overloading**

1) What does this print:
Foo f;

f.name = “kat”;

cout << f \* 4 << endl;

class Foo {

 public:
 string name;

 string operator\*(int fred) {
 string ans = name;

 for(int i = 0; i < fred; i++)

 ans = ans + name;

 return ans;

 }

**Programs to write**

**Only write ONE of these. On the computer. They have different point values; do the most valuable one you can.**

(11 points) Write me a class ‘Interval’. It keeps track of the biggest and smallest number seen. As used below, it should print (-3, 17). Use the main shown below.

|  |
| --- |
| int main() { Interval I; I.add(12); I.add( 3); I.add( 17); I .add(-3); cout << I << endl;} |

(11 points) Write me a class Number. It just holds on integer. Use the main shown below.

|  |
| --- |
| int main() { Number n; n = n + 2; cout << n << endl; // should print a 2 n = n + 5; cout << n << endl; // should print a 7 n = 10 + n; cout << n << endl; // should print a 17;} |

(5 points) Make a program that prints the fifth line it’s own source code five times.

(4 points) My function fred(x) is defined as shown below. Tell me what fred(100) is.

 fred(x) = 1 if x < 2

 fred(x) = 1+fred(x/2) if x >= 2