

CS 12 - Quiz 5

March 12, 1997

1. State whether the following sets of functions are legal or illegal.

(a) (3 pts)

```
void func(int i);  
void func(int x);
```

Answer: legal.

(b) (3 pts)

```
void func2(int i, double a, char c);  
int func2(int i, double a, char c);
```

Answer: illegal, ambiguity.

(c) (3 pts)

```
void func3(int x, double y);  
void func3(double y, int x);
```

Answer: legal.

2. (15 pts) Overload the << operator to display the following class. Show any necessary changes to the class.

```
class shape  
{  
    private:  
        int num_sides;  
        char color[10];  
    public:  
        shape(int num, char *col) { num_sides = num, strncpy(color, col, 10); }  
        friend ostream &operator<<(ostream &os, shape &_shape);  
};  
  
ostream & operator<<(ostream &os, shape &_shape)  
{  
    os << "number of sides: " << _shape.num_sides << endl;  
    os << "color of shape: " << _shape.color << endl;  
    return os;  
}
```

3. (16 pts) Write a recursive function that prints a non-negative integer with commas in the appropriate places. For example, if passed the integer 12178, it should print "12,178". (Hint: use / and %)

Answer:

```
void print_commas(unsigned int num) {
    int tmp = num % 1000;
    if (num > 1000) {
        print_commas(num / 1000);
        cout << tmp << ",";
    }
    else
        cout << num << ",";
}
```

4. (10 pts) Describe the difference between a virtual function and a normal C++ function. Give a reason why virtual functions are useful.

Answer:

Virtual functions allow member functions with the same name to be selected based on the type of the class object pointed to, not the type of the pointer like normal functions. Virtual functions are useful for class inheritance so that functions that apply to all inherited classes do not have to be redeclared.