

CS389 Programming Languages Lab, Spring 2008

Written Test, Nov. 13, 2pm-3:30 pm

Write your answers in empty spaces below or to the right of the questions.

Marks: 30 (1*6 + 3*8)

1. In 'C', int is a subtype of float. state true or false:
2. C supports scoping rules.
3. In Scheme (= 'a 'c) will return
4. In Scheme (equal? '(1 2 3) '(2 1 3)) will return
5. In Scheme (caddr '(1 2 3 4 5 6)) will return
6. The return type of *sizeof()* function in
7. Compute results for f(a), f(X) and f(c)?

```
g(a,a).
g(b,c).
f(a):-!.
f(X):-g(a,X).
f(X):-g(b,X).
```

8. There is an interesting error in the following program. Find it.

```
#include <iostream>
using namespace std;
class A {
public:
    A() {};
    virtual void f(){} };
class B {
public:
    B() {};
    virtual void f(){} };

main () {
    A a;
    B b;
    int x = a&&b;
    cout << x;
    a.f();
    A *ap = new A();
    ap->f();
}
```

9. What is the output of the below program?

```
#include<iostream>
using namespace std;
class A {
public: void virtual f(){cout<<"A::f\n";}
       void g(){cout<<"A::g\n";} };
class B: public A{
public: void f(){cout<<"B::f\n";}
       void virtual g(){cout<<"B::g\n";} };
class C: public B{
public: void virtual f(){cout<<"C::f\n";}
       void g(){cout<<"C::g\n";} };
int main () {
A*a; B*b; C*c;
c=new C(); c->f();c->g();
b=c; b->f(); b->g();
a=b; a->f(); a->g();
b=new B(); b->f(); b->g();
a=b; a->f(); a->g();
}
```

10. What will be the output of the below program?

```
#include<iostream>
using namespace std;
class C;
class D;
class A {
public: void virtual f(C *c){cout<<"A::f1\n";}
       void virtual f(D *d){cout<<"A::f2\n";}
};
class B: public A{
public: void virtual f(C* c){cout<<"B::f1\n";}
       void virtual f(D *d){cout<<"B::f2\n";}
};
class C{}; class D:public C{};
int main () {
A *a; B *b; C *c; D *d;
b = new B(); a=b;
d = new D(); c=d;
b->f(c); b->f(d);
a->f(c); a->f(d);
}
```

11. What will be the output of the below program?

```
class AClass {
    public static void main(String[] args) {
        B b[] = new B[10]; A a[] = new A[10];
        a = b; f(a[0]); g(a);
    }
    static void f(A a) {
        try{ a = new A();
            System.out.println(a.f());
            a = new B();
            System.out.println(a.f());} catch(Exception e1){ }
    }
    static void g(A a[]) {
        try{ a[0] = new A();
            System.out.println(a[0].f());
            a[0] = new B();
            System.out.println(a[0].f());} catch(Exception e2){ }
    }
}
class A {public int f() {return 10;}}
class B extends A {public int f(){return 20;}}
```

12. Following Haskell code demonstrates two versions of factorial problem. What do you see as the difference between the styles in which the programs are written? Which one is more efficient? From what point of view?

```
fact1 0 = 1
fact1 n = n*fact1(n-1)
```

```
fact2 n = fact2helper(n,1)
fact2helper 0 f = f
fact2helper n f = fact2helper(n-1,n*f)
```

13. What will be the output of the following pseudo code in the four cases of parameter passing by (1) value (2) reference (3) name and (4) copy/restore (i.e. value/result).

```
global x = 10;
f(y,z){
    i = 10;
    y = 20+z;
    print x;
}

main(){
    i = 50;
    f(x,i);
    print x;
}
```

14. What's the output of the below program?

```
#include<stdio.h>
void f(int **x){
    int y = 10;
    int *z = &y;
    x = &z;
    **x=30;
}

main(){
    int y = 20;
    int *x = &y;
    f(&x);
    printf("%d\n", *x);
}
```