C++ for IT Quants

1- Determine the value of d1 at the end of the last loop:

```
double d1=0.;
for( double d=0. ; d<1e15 ; d+=0.23 )
{
   d1 = d + 1 – 1; d1 = (d1 - d);
}
```

2- Give an example of a genuine need for "capping" a class hierarchy to avoid virtual function calls.

3- Determine the value of “a” in :

```
bool b1, b2;
int a = 298*302 == 89996 ? 3 << 2 : b1^b2;
```

4- STL Containers (true/false? why?)

4a- find : O(log n) for vector and map, O(n) for list.
4b- insert : O(n)for vector, O(log n) for map, O(1) for list.
4c- remove : O(n)for vector, O(log n) for map, O(1) for list.

5- What about the following code?

5a-

```
inline static double median( std::vector<double>& v )
{
        size_t vsize = v.size();
        double median = 0.0;
        if( vsize > 0 ) {
                sort( v.begin(), v.end() );
                if( (vsize%2) == 0 ) {
                        int i1 = (int) floor((double)vsize / 2.);
                        double a = v[--i1]; double b = v[++i1];
                        median = (a + b) / 2;
                }
                else {
                        if( vsize == 1 ) { median = v[0]; }
                        else { int i1 = (int)ceil((double)vsize / 2.);  median = v[--i1];}
                }
        }
        else  {
           std::stringstream sstr; sstr << "median invalid parameters : " << "vsize:" << vsize;
           throw sstr.str();
        }
        return median;
}
```

5b-

```
class A
{
public:
   A() : b_(0.) {} inline const A* getA( const A*& a ) const { return a;} double b_;
};

int _tmain()
{
                A* a = new A(); try{if(a->getA(a)->b_==0.) throw 2.;} catch(double d){}
               catch(...){throw;}
               std::cout << "end of test"; return 0;
}
```

6- What makes the following code?

```
class A
{
public:
               A::A(A* a) : a(a)          { std::cout << "A::A" << std::endl;    }
               A::~A()                    { std::cout << "A::~A" << std::endl;  }
               A* a;
               double d;
};

class B : virtual public A
{
public:
               B::B(A* a) : A(a) { std::cout << "B::B"   << std::endl; }
               virtual ~B()          { std::cout << "B::~B" << std::endl; }
               static compute(double& d) {A* a(new B(new A(NULL))); d = a->a->d; }
};

int main(void)
{
               double d; B::compute(d); std::cout << d << std::endl; return 0;
}
```

7- Write down a c++ pattern that computes PI using Monte Carlo method