UNIVERSITY OF DUBLIN

XM34631

TRINITY COLLEGE

FACULTY OF SCIENCE

SCHOOL OF MATHEMATICS

JS/SS Maths/TSM

Michaelmas Term 2012

MATHEMATICS 1262: C++ PROGRAMMING: 3 SPECIMEN QUESTIONS

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Attempt 3 questions

SECTION II

5. (a) What does the following code do?

```
#include <iostream>
using namespace std;
int main()
{
  bool finished;
  double x, s1, s2, a, v;
  int n;
  s1 = s2 = 0;
 n = 0;
  finished = false;
  while ( ! finished )
  { cin >> x;
    if ( cin.eof() )
    { finished = true; }
    else
    { s1 += x;
      s2 += x*x;
      ++n;
    }
  }
  a = s1/n;
  v = (s2 - n*a*a)/(n-1);
  cout << "n " << n << " a " << a << " v " << v << endl;
  return 0;
}
```

- (b) Describe in outline another program to compute the same quantities.
- (c) What are the advantages and disadvantages of the two methods?
- 6. (a) Write a program which reads lines from standard input and prints any line in which the word 'ladle' occurs. Note: the string class has a constructor taking a char * argument (C-style string). Also, string::find(string sub) returns the position of sub in the string, default string::npos.
 - (b) Write the routines for the following class Vec3 etcetera.
- 7. (a) Simulate the following non-recursive routine, showing exactly what gets printed.

```
#include <iostream>
using namespace std;
int xxx ( int n )
{ int i, s;
   s = 0;
   for (i=0; i<n; ++i)
      s += 2*i + 1;
   return s;
}
int main()
{ cout << "xxx(3) is " << xxx ( 3 ) << endl;
   return 0; }</pre>
```

- (b) What does xxx(n) return in general, given $n \ge 0$?
- (c) Simulate the following recursive routine, showing exactly what gets printed.

```
#include <iostream>
using namespace std;
int yyy ( int n )
{ if ( n <= 9 )
    return 0;
else</pre>
```

```
return 1 + yyy ( n/10 );
}
int main()
{ cout << "yyy(1234) is " << yyy ( 1234 ) << endl;
   return 0; }
(d) What does yyy(n) return in general, given n ≥ 1?</pre>
```

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