University of St Andrews
School of Computer Science
CS2002 Computer Systems: C and Systems Programming
Tutorial Sheet for Week 2

1. What is the difference between declaring a variable or function and defining it? What happens if you never define a variable, or define it more than once? When do you discover this?

2. What purpose does a *function prototype* serve in C? Give examples for

   a) A function to add two doubles;

   b) a function that prints a pair of unsigned short arguments, representing a month and a day as a date.

3. What is a header file used for, and how does this assist separate compilation? What items would you expect to see in a header file?

4. What is the difference between the use of a *static* qualifier in C and in Java? What is the meaning of the *extern* qualifier in C? Illustrate your answer by referring to the following program.

```
// file1.c

extern int value;
int main() {
  printf("%d\n", value);
}

// file2.c

static int value = 1;
```

5. Find all the bugs in the following program. Explain how you would fix them.

```
// library.c – You may not change this file
// and must use this function.
long square(long x) {
  return x*x;
}

// main.c
int main() {
  int x = 1000000;
  printf("The square of %d is %d\n", x, square(x));
}
```

6. What is the purpose of the unary & operator in C?

7. Why use C at all, in a world which has Java, which appears to be more powerful, safer and more expressive than C?