

OLLSCOIL NA hÉIREANN, GAILLIMH
NATIONAL UNIVERSITY OF IRELAND, GALWAY

SUMMER EXAMINATIONS 2004

FIRST YEAR EXAMINATION IN FINANCIAL MATHEMATICS
AND ECONOMICS
CS103 — COMPUTER SCIENCE

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Time allowed: Two hours.
Answer *three* questions.

1.

(a) Explain the following terms:

- (i) *token*,
- (ii) *identifier*,
- (iii) *comment*,
- (iv) *expression*, and
- (v) *statement*.

(b) Illustrate by example how the following operators work:

- (i) `&&`,
- (ii) `&`,
- (iii) `/=`,
- (iv) `++`, and
- (v) `%`.

(c) Assuming the declarations and initializations:

`int a = 3, b = -1, c = 4;`

give the values of the following expressions, if they are legal:

- (i) `-b < (a < c)`,
- (ii) `2 - c % a + b`, and
- (iii) `++a*c--`.

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2.

- (a) Rewrite the following program using proper indentation, comments and descriptive identifiers to make it more readable and well documented.

```
int main(void ){float qx,
zz,
tt;printf("gimme 3" );scanf
( "%f%f %f",&qx,&zz
,&tt);printf("averageis=%f",
(qx+tt+zz)/3.0);return
0;}
```

- (b) Describe the process of function invocation in a C program.

3. Write a short program that uses a *recursive function* to print out the integer n , digit by digit, if n is given as a command line argument, as follows. As first things in the file, include the header files `stdio.h` and `stdlib.h`. Then define a function `printd()` which takes an integer argument n , returns no value and whose body consists of the following three statements.

- (i) If the argument n is negative, use `putchar()` to print out a minus sign and replace n by $-n$.
- (ii) Call `printd()` recursively with argument $n/10$ provided this is not zero.
- (iii) Use `putchar()` to print the last digit of n as $n \% 10 + '0'$.

Then define a `main()` function that provides access to the command line through `argc` and `argv` such that

- (i) an error message is printed unless the command line consists of exactly two words, the name of the program and a command line argument;
- (ii) `printd()` is applied to the command line argument after it has been converted to an integer by the function `atoi()`;
- (iii) a newline character is printed out.

4.

- (a) Write a short C program that will print its command line arguments.
- (b) Write a C program that prints out a table of powers n^m for $n, m \in \{1, 2, \dots, 7\}$.
- (c) Explain the form and purpose of function prototypes.