

Sample Quiz 1 (Practice, not graded)

CMSC 14300 - Systems Programming

Covers Lectures 1 through 4

Instructions. This practice quiz mirrors the length and style of the real Quiz 1: about 20 minutes, closed book, no computer. Write your C by hand. You do not need to write `#include` lines or a full `main` unless a problem asks for one. Minor syntax slips are fine as long as your logic is clear.

Name: _____

Total: 30 points

Part A. Short answer (12 points)

A1. (4 pts; 1 pt each) For each expression, give its value *and* its type (`int` or `double`).

(a) `17 / 5`value: type: (b) `17 % 5`value: type: (c) `17 / 5.0`value: type: (d) `(double)(17 / 5)`value: type:

A2. (3 pts; 1 pt each) Number bases.

(a) Convert the decimal value 45 to 8-bit binary.

(b) Convert that same value to hexadecimal.

(c) What decimal value is the hex literal `0x2C`?

A3. (5 pts; 1 pt each) Give the value of each expression. Treat all operands as `unsigned int`.

(a) `6 & 3`(b) `6 | 1`(c) `1 << 4`(d) `6 && 0`

Then, in one sentence, explain why the answers to (a) and (d) differ. (1 pt)

Part B. Reading code (8 points)

B1. (5 pts) What does this program print? Write the exact output.

```
1  #include <stdio.h>
2
3  int main(void) {
4      int total = 0;
5      for (int i = 1; i <= 6; i++) {
6          if (i % 3 == 0) {
7              continue;
8          }
9          total += i;
10         printf("i=%d total=%d\n", i, total);
11     }
12     return 0;
13 }
```

B2. (3 pts) This function is meant to return 1 when x equals 5 and 0 otherwise, but it has a bug. Identify the bug and give the corrected line.

```
1  int is_five(int x) {
2      if (x = 5) {
3          return 1;
4      }
5      return 0;
6  }
```

Part C. Write code (10 points)**C1.** (10 pts) Write a function

```
int longest_run(unsigned int x)
```

that returns the length of the longest run of *consecutive* 1 bits in **x**. For example, `longest_run(13)` returns 2: 13 is 1101 in binary, whose runs of 1 bits have lengths 2 and 1, and the longer is 2. As another example, `longest_run(0)` returns 0. Use the shift-and-mask idea from lecture.

End of sample quiz. Good luck on the real one.

Reference sheet

These tables are provided for your convenience. You do not need to memorize them.

Decimal / Binary / Hex (0 to 16)

Dec	Binary	Hex
0	0000	0x0
1	0001	0x1
2	0010	0x2
3	0011	0x3
4	0100	0x4
5	0101	0x5
6	0110	0x6
7	0111	0x7
8	1000	0x8
9	1001	0x9
10	1010	0xA
11	1011	0xB
12	1100	0xC
13	1101	0xD
14	1110	0xE
15	1111	0xF

Short ASCII table

Char	Dec	Hex	Note
'\n'	10	0x0A	newline
' '	32	0x20	space
'\t'	9	0x09	tab
'0'	48	0x30	digit start
'9'	57	0x39	digit end
'A'	65	0x41	uppercase start
'Z'	90	0x5A	uppercase end
'a'	97	0x61	lowercase start
'z'	122	0x7A	lowercase end

Handy facts: digits, uppercase, and lowercase letters are each contiguous, so `c - '0'` is a digit's value, `c - 'a'` is a letter's position (0 to 25), and `'a' - 'A'` is 32 (the gap between the cases).