

# CS 451/551 Quiz 2 Annotated Solution

Date: Feb 24, 2016

Max Points: 15

**Important Reminder** As per the course Academic Honesty Statement, cheating of any kind will minimally result in receiving an F letter grade for the entire course.

1. Which of the following declarations is semantically illegal?

- a) `const int (*f)();`
- b) `int f(int (*)());`
- c) `int (*f)();`
- d) `int f(int x);`
- e) `const int *f();`

**Answer:** (c).

In (c), `f` is declared as a pointer to a function returning a function to an `int`, but functions cannot return functions. The other declarations are legal: (a) declares `f` to be pointer to a function returning a `const int`; (b) declares `f` to be a function taking a pointer to function returning `int` argument and returning a `int`; (d) declares `f` to be a function taking an `int` argument and returning a `int`; (e) declares `f` to be function return a pointer to a `const int`.

2. The default buffering on the C library standard streams `stdin`, `stdout` and `stderr` is:

- a) All streams are line buffered.
- b) All streams are fully buffered.
- c) `stdin` and `stdout` are line buffered, `stderr` is unbuffered.
- d) `stdin` and `stdout` are line buffered if they refer to a terminal-like device, otherwise they are fully buffered; `stderr` is unbuffered.
- e) `stdin` and `stdout` are fully buffered, `stderr` is line unbuffered.

**Answer:** (d).

By default, `stdin` and `stdout` are line buffered if they refer to a terminal-like device, otherwise they are fully buffered; `stderr` is unbuffered so that errors are displayed ASAP.

3. Checking by the C-library `assert ( )` feature can be turned off:

- a) At compile time.
- b) At program load time.
- c) At runtime.
- d) At compile time or at runtime.
- e) At compile time or at program load time.

**Answer:** (a)

Checking by `assert ( )` can be turned off at **compile-time** by defining the macro `NDEBUG`.

4. Which of the following statements is **clearly false**?

- a) The `open ( )` call will always return the lowest-numbered available descriptor.
- b) It is possible to seek beyond the end of a file.
- c) When a new process is `fork ( )`'d, it starts execution at the `main ( )` function.
- d) Scatter-gather I/O allows reading/writing multiple buffers using a single system call.
- e) A process can set things up so that updating one I/O file descriptor can affect another descriptor open in the same process.

**Answer:** (c)

When a new process is `fork ( )`'d it starts executing at the point where the `fork ( )` returns with a return value of 0. The other statements are true.

5. Given the following C code:

```
union {
    int i;
    char c[sizeof(int)];
} u = { 0x12345678 };
unsigned char x = u.c[2];
```

assuming that a `int` occupies 4 bytes and is laid out in **big-endian** order, what will be the value of `x`?

- a) Undefined.
- b) `0x12`.
- c) `0x34`.
- d) `0x56`.

e) 0x78.

**Answer:** (d)

A big-endian layout will be 0x12345678, with the big end value 0x12 in the lowest address. Hence `c[0] == 0x12`, `c[1] == 0x34`, and `c[2] == 0x56`.

6. Which of the following is the most necessary characteristic of a 64-bit C program?

- a) 64-bit array indexes.
- b) 64-bit `int`'s.
- c) 64-bit `double`'s.
- d) 64-bit `long`'s.
- e) 64-bit pointers.

**Answer:** (e)

The other characteristics will depend on compiler decisions, but a 64-bit program will definitely be characterized by 64-bit pointers.

7. Given the following C/Unix calls:

- `atoi()`
- `fopen()`
- `fork()`
- `setjmp()`
- `strcmp()`

which of the following pairs have the most specific similar characteristics?

- a) `atoi()` and `fopen()`.
- b) `fopen()` and `strcmp()`.
- c) `fork()` and `strcmp()`.
- d) `fork()` and `setjmp()`.
- e) `setjmp()` and `strcmp()`.

**Answer:** (d)

`fork()` and `setjmp()` share the characteristic that they may return more than once; all the other pairs are regular functions in that (barring errors), they would return exactly once.