



*Department of Computer Science & Software Engineering  
The University of Western Australia*

**Mid-Semester Test  
August 2019**

**Systems Programming 2002 (CITS2002)**

**This paper contains 1 section**

This paper contains: 8 pages (including this title page)

Time allowed: 45 minutes (no additional reading time)

Each question is worth 1 mark.

Marks for this paper total 20.

Candidates should attempt ALL questions.

This is a closed book examination – no written materials, electronic devices or calculators are permitted.

**PLEASE NOTE**

*Examination candidates may only bring authorised materials into the examination room. If a supervisor finds, during the examination, that you have unauthorised material, in whatever form, in the vicinity of your desk or on your person, whether in the examination room or the toilets or en route to/from the toilets, the matter will be reported to the head of department and disciplinary action will normally be taken against you. This action may result in your being deprived of any credit for this examination or even, in some cases, for the whole unit. This will apply regardless of whether the material has been used at the time it is found.*

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1.

(1) Which description best describes the role of a compiler?

- A. to convert English instructions into a computer program.
- B. to convert computer programs into English instructions.
- C. to convert a program written in a higher level language into a machine language program.
- D. to compile a program into an operating system process.

(2) Which of the following statements about the `cc` program is true?

- A. `cc` is Apple's proprietary C99 C compiler for the Macintosh platform.
- B. `cc` enforces the C99 standard.
- C. `cc` first passes C source code files to a preprocessor.
- D. `cc` helpfully corrects insignificant syntax errors in C source files.

(3) Which of the following is a valid C99 preprocessor directive?

- A. `#import`
- B. `#main`
- C. `#include`
- D. `#exit`

(4) Roughly, how many standard header files are defined by the C99 standard:

- A. 7
- B. 20
- C. 50
- D. 200

(5) Which of the following functions is defined in the standard `<ctype.h>` header file?

- A. `ischar`
- B. `isinteger`
- C. `isalpha`
- D. `isstring`

(6) In which of the C99 standard header files would you expect to find the definition of *EXIT\_FAILURE* ?

- A. <stdio.h>
- B. <stdlib.h>
- C. <string.h>
- D. <stdbool.h>

(7) Consider the following C99 variable definition:

```
int buffer[100];
```

What can we say about the expression `sizeof buffer` ?

- A. The expression has the value 400.
- B. The value of the expression is operating system and compiler dependent.
- C. As we do not know what is stored in `buffer`, we cannot know the value of the expression until runtime.
- D. The value of the expression is defined to be undefined in pre-C99 programs, but defined to be 800 in C99 programs.

(8) Which of the following words is a valid C99 control-flow keyword?

- A. void
- B. do
- C. skip
- D. repeat

(9) Which of the following statements about C99 arrays is true?

- A. Equality testing (`==`) is allowed on arrays.
- B. Assignment (`=`) is allowed between arrays.
- C. Array contents are copied when passed to functions.
- D. None of the above.

(10) Consider the following code which contains a common error:

```
#define N      10;

void function(void)
{
A)   char array[N];
B)   int  x = 2 * N;

C)   for(int i=0 ; i<N  ++i) {
      printf("%c\n", array[i] );
      }
}
```

Which of the following lines contains a syntax error?

- A. Line A.
- B. Line B.
- C. Line C.
- D. All of A, B, and C.

(11) What is printed when the following function is called?

```
void function(void)
{
    char array[] = "hello\nworld";

    for(int i=0 ; i<strlen(array) ; ++i) {
        array[i] = '\0';
    }
    printf("%s\n", array);
}
```

- A. hello
- B. hello  
world
- C. A blank line.
- D. Nothing. There is an infinite loop in the code.

(12) What is printed when the following function is called?

```
void function(void)
{
    for(int i=0 ; i<5 ; ++i) {
        switch (i%3) {
            case 0 :    printf("%i ", i);
            case 1 :    printf("%i ", i);
        }
    }
    printf("\n");
}
```

- A. 0 1 2 3 4
- B. 0 0 1 3 3 4
- C. 1 3 5
- D. 0 1 1 2 3 4 4

(13) Assuming N is a positive integer, what is printed when the following function is called?

```
void function(void)
{
    int A[N+1][N+1];

    for(int j=0 ; j<N ; ++j) {
        for(int i=0 ; i<N ; ++i) {
            if((i%N) == j)
                A[j][i] = 1;
            else
                A[j][i] = 0;
        }
    }
    for(int j=0 ; j<N ; ++j) {
        for(int i=0 ; i<N ; ++i) {
            printf("%i ", A[i][j]);
        }
        printf("\n");
    }
}
```

- A. We cannot tell without knowing the value of N.
- B. A square array of zeroes, except for 1's on the main diagonal.
- C. A square array of zeroes, except for 1's on both diagonals.
- D. None of the above.

(14) Consider the following array declaration:

```
int arr[20];
```

Which of the following code fragments moves all the integers in index positions 1 through 5 inclusive one place to the left to index positions 0 through 4 inclusive?

- A. 

```
for (int i = 1; i <= 5; i++)  
{  
    arr[i] = arr[i+1];  
}
```
- B. 

```
for (int i = 0; i < 5; i++)  
{  
    arr[i] = arr[i+1];  
}
```
- C. 

```
for (int i = 5; i >= 0; i--)  
{  
    arr[i] = arr[i+1];  
}
```
- D. 

```
for (int i = 5; i > 0; i--)  
{  
    arr[i] = arr[i+1];  
}
```

(15) Which of the following statements about how lines are terminated in text files is true?

- A. The end of a line is represented by the NULL-byte character.
- B. The end of a line is represented by the newline character.
- C. The end of a line is represented by the carriage-return character followed by the end-of-line character.
- D. The way the end of a line is represented is operating-system dependent.

(16) What happens if the *fopen* function fails to open a file for writing?

- A. Execution continues normally.
- B. The operating system simply ignores the request.
- C. The process is blocked until sufficient disk space is available.
- D. An error message is printed and the process is terminated.

- (17) Operating systems started supporting multiprogramming because:
- A. programmers started writing multiple programs.
  - B. AI programs started writing other programs.
  - C. As RAM capacity grew, computers could store multiple programs.
  - D. It was the best way of keeping the processor busy.
- (18) Which one of these is NOT a traditional process state?
- A. ready.
  - B. running.
  - C. ready/suspend.
  - D. waiting.
- (19) A “blocked process” is a process that:
- A. blocks the internal hardware of a computer.
  - B. has been blocked by the operating system because it is an illegal process.
  - C. has made an input/output request.
  - D. tries to block the user from using a computer.
- (20) Which of the following is NOT a reason for the *fork* system call failing?
- A. the user already has too many processes running.
  - B. The whole computer system has exhausted its available memory.
  - C. the value returned by *fork* is -1.
  - D. the parameter passed to *fork* is not a valid process-identifier.
-



## Solutions

1.

1. C
  2. C
  3. C
  4. B
  5. C
  6. B
  7. B
  8. B
  9. D
  10. A
  11. C
  12. B
  13. B
  14. B
  15. D
  16. A
  17. D
  18. D
  19. C
  20. D
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