Department of Computer Science & Software Engineering
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Sample Mid-Semester Test
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CITS2002 Systems Programming

This paper contains 1 section

This paper contains: 8 pages (including this title page)
Time allowed: 45 minutes (no additional reading time)

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 C11 C compiler for the macOS operating system.

    B. `cc` enforces the C11 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 C11 preprocessor directive?

    A. #import

    B. #main

    C. #include

    D. #exit

(4) Roughly, how many standard header files are defined by the C11 standard:

    A. 10

    B. 30

    C. 100

    D. 300

(5) Assuming a program is always supplied with at least one command-line argument, which of the following expressions returns the last command-line argument supplied?

    A. argv[0]

    B. argv[1]

    C. argv[argc-1]

    D. argv[argc]

(6) In which of the C11 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 C11 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-C11 programs, but defined to be 800 in C11 programs.

(8) Which of the following words is a valid C11 control-flow keyword?

    A. void

    B. do

    C. skip

    D. repeat

(9) Which one of the following statements about function parameters is true?

    A. Empty parameter lists are declared with the keyword `void`.

    B. If there is only one parameter, the parameter list is not required.

    C. A function's parameters are known as "actual parameters".

    D. A local variable may have the same name as a function's parameter, overriding the use of the parameter.

(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 is 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. A
10. A
11. C
12. B
13. B
14. B
15. D
16. A
17. D
18. D
19. C
20. D