FULL NAME

STUDENT ID

004117540

TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI



MID-TERM TEST - 2019 TRIMESTER 1

NWEN241

SYSTEMS PROGRAMMING

Α	6
В	10
С	23
	39

Time allowed: 45 MINUTES

CLOSED BOOK

Permitted materials: Only silent non-programmable calculators or silent

programmable calculators with their memories cleared are permitted in this examination. No electronic dictionaries are allowed.

Paper foreign to English language dictionaries are

allowed.

Instructions:

Attempt ALL TWENTY-FOUR (24) questions.

There are THREE sections:

- SECTION A True or False [8 marks]
- SECTION B MCQ [12 marks]
- SECTION D Short Answer [25 marks]

The examination consists of 45 marks in total.

You must use the answer sheet provided for Sections A (Questions 1-8) and B (Questions 9-20). For Section C (Questions 21-24), you must write your answers in the boxes provided within this questionnaire.

Submit both the answer sheet and this questionnaire.

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SECTION A True or False

Use the answer sheet provided for answering the questions in this section. Each correct answer will garner 1 mark.

- 1. An abstract class is a class that has at most one pure virtual function member.
 - (a) True
 - (b) False
- 2. One key difference between C++ structures and C structures is that C++ structures can have member functions.
 - (a) True
 - (b) False
- 3. In the assembly phase, the compiler translates a pre-processed C/C++ source code into an assembly file.
 - (a) True
 - (b) False
- 4. In C and C++, there is no check on whether an array index is out of bounds. If an array index goes out of bounds, the program *always* terminates in an error.
 - (a) True
 - (b) False
- 5. Arrays can be initialised during their declaration. If there are fewer initial values than the array size, the remaining elements are initialized to 0.
 - (a) True
 - (b) False
- 6. The base address of an array is the address of the first array component.
 - (a) True
 - (b) False
- 7. The following C code will compile without errors:

```
int foo(const int * a, const int * b)
{
    *a = 5;
    return *a + *b;
}
```

- (a) True
- (b) False
- 8. In C++, the statement delete p; deallocates the variable pointer p.
 - (a) True
 - (b) False

SECTION B Multiple Choice

Use the answer sheet provided for answering the questions in this section. Each correct answer will garner 1 mark.

9. Consider the following statement:

```
char str[] = "Twelve";
```

What is the size of the array str?

- (a) The statement will cause a syntax error.
- (b) 6
- (c) 7
- (d) None of the above
- 10. Consider the following code fragment:

```
int i = 4, j = 0;
while(--i) { j++; }
```

What is the value of the variable j after the completion of the while-loop?

- (a) The code will not compile because of syntax error in the while-loop condition.
- (b) 2
- (c) 3
- (d) 4
- 11. Consider the following code snippet:

What is the size of the variable u equal to?

- (a) sizeof(char)
- (b) sizeof(short)
- (c) sizeof(int)
- (d) None of the above

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12. Consider the following function-like macro:

```
#define FLM(X,Y) X/Y
```

To what value does the macro evaluate to when invoked as FLM(2 + 9; 3 - 2)?

(Hint: The operator / has higher precedence than + and -. The operators + and - have the same precedence, with left to right associativity.)

- (a) 11
- (b) 3
- (c) 1
- (d) None of the above
- 13. Consider the following C/C++ code snippet:

```
o 2 3
enum loudness { faint = -1, moderate, defeaning = 2, painful };
```

What is the value of moderate?

- (a) 0
- (b) 1
- (c) 2
- (d) None of the above
- 14. In C and C++, generic pointers can be declared with
 - (a) static
 - (b) void
 - (c) const
 - (d) None of the above
- 15. Given the declaration below:

```
char name[30];
```

Which of the following statements are invalid?

```
i. name = "Terakihi";
ii. strcpy(name, "Snapper");
Jiii. name = {'H', 'a', 'k', 'e'};
iv. name[0] = 'G';
```

- (a) i and iii
- (b) ii and iv
- (c) i and ii
- (d) They are all valid

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16. What is the output from the following C++ code?

```
#include <iostream>
   using namespace std;
   int main(void)
        int * ptr = new int;
        cout<<ptr<<" - "<<*ptr;
        return 0;
   }
   (a) (Address of memory allocated) - (Garbage value)
   (b) (Address of memory allocated) - 0
   (c) (Address of ptr) - (Garbage value)
   (d) (Address of ptr) - 0
17. Given the C++ declaration:
    char name[8] = "Marlin";
    Which of the following statements output Marlin?
   i. std::cout << name;
   ii. for(int j=0; j<6; j++) std::cout << name[j];</pre>
    iii. int j=0; while (name[j] != '\0') std::cout << name[j++];
    iv. int j=0; while (j < 8) std::cout << name[j+1];</pre>
    (a) All of the above
    (b) None of the above
    (c) i, ii and iii
    (d) i, iii and iv
```

- 18. Whaf is the name of the & operator in relation to pointers?
 - (a) Conditional operator
 - (b) Logical operator
 - (c) Address of operator
 - (d) None of the above
- 19. What is the output of the following program?

```
#include<stdio.h>
int main()
{
    int a[5] = {2, 3};
    printf("%d,%d,%d\n", a[2], a[3], a[4]);
    return 0;
}
```

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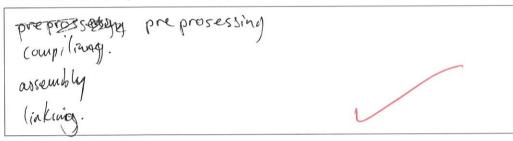
- (a) Garbage values
- (b) 2,3,3
- (c) 3,2,2
- (d) 0,0,0
- 20. What would be the equivalent pointer expression for referring to the array element a [i,] [j,] [k,] [1]?
 - (a) ((((a+i)+j)+k)+1)
 - (b) *(*(*(a+i)+j)+k)+1)
 - (c) (((a+i)+j)+k+1)
 - (d) ((a+i)+j+k+1)

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SECTION C Short Answer

Write your answer in the space provided.

21. What are the four phases of compilation in C and C++? (8 marks)

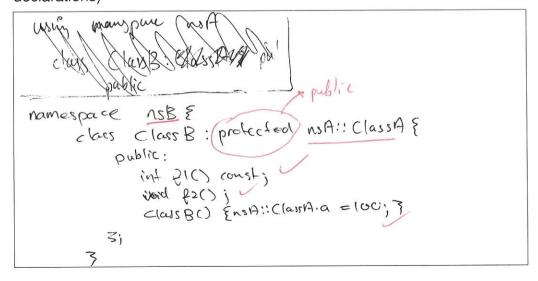


22. Consider the following C++ class declaration: (5 marks)

```
namespace nsA {
    class ClassA {
    public:
        virtual int f1() const = 0;
        virtual void f2() = 0;
    protected:
        int a;
    };
}
```

Declare a class ClassB that extends ClassA but in a different namespace called nsB. ClassB should preserve the access specifier of the members, should not be abstract, and should have an inline default constructor that initializes the member variable a to 100.

(Hint: You do not need to show function implementations, just the prototype declarations)





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23. Given these two variable declarations in a C program:

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char str1[] = "I am a string. $\n"$; char *str2 = "I am a string. $\n"$;

(a) What is the difference between the two statements? (1 mark)

they differ only in notation, that



(b) Write a statement to output the letter "s" in str1 using printf. Use array index to refer to the element. (2 marks)

printf("%c", strl[]);



(c) Write a statement to output the letter "s" in str2 using printf. Use appropriate pointer arithmetic and operator to refer to the element. (2 marks)

print f ("/.c", * (str2+3/));



- (d) Write some code to copy the second string to the first. Which header file do you need to include? (2 marks)
- (Hint: The function char *strcpy(char *dest, const char *src) copies the string pointed to by src to dest.)

Code to copy second string to first:

stropy (strl, str2);



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Header file to include:

*include Lestring.h >

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24. Given the following code:

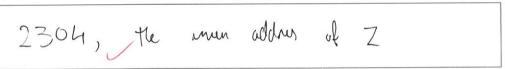


Suppose each char occupies 1 byte of memory and the variable Z is at (decimal) address 2304 and the variable Y is at (decimal) address 2305. After the code above has run:

(a) What value is represented by &Y? (1 mark)

2305,	the	men	address	of 9	
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(b) What value is represented by pZ? (1 mark)



(c) What value is represented by pY? (1 mark)

(d) What value is represented by *pZ? (1 mark)

(e) What is the value represented by *pY? (1 mark)

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