北京郵電大學

Queen Mary University of London

For examiners' use only

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EBU4161 B

Joint Programme Examinations 2021/22

EBU4161 Programming Fundamentals

Paper B

Time allowed 2 hours

Answer ALL questions

Complete the information below about yourself very carefully.

QM student number										
BUPT student number										
Class number										

NOT allowed: electronic calculators and electronic dictionaries.

INSTRUCTIONS

1. **You must NOT take answer books, used or unused, from the examination room.**
2. Write only with a black or blue pen **and in English**.
3. Do all rough work in the answer book – **do not tear out any pages**.
4. If you use Supplementary Answer Books, tie them to the end of this book.
5. Write clearly and legibly.
6. **Read the instructions on the inside cover.**

Examiners

Dr Jinglin Li, Dr Yang Zhang

Instructions

Before the start of the examination

1) Place your BUPT and QM student cards on the corner of your desk so that your picture is visible.

2) Put all bags, coats and other belongings at the back/front of the room. All small items in your pockets, including wallets, mobile phones and other electronic devices must be **placed in your bag in advance**. **Possession of mobile phones, electronic devices and unauthorised materials is an offence.**

3) Please ensure your mobile phone is switched off and that no alarm will sound during the exam. **A mobile phone causing a disruption is also an assessment offence.**

4) Do not turn over your question paper or begin writing until told to do.

During the examination

1) You must not communicate with or copy from another student.

2) If you require any assistance or wish to leave the examination room for any reason, please raise your hand to attract the attention of the invigilator.

3) If you finish the examination early you may leave, but not in the first 30 minutes or the last 10 minutes.

4) For 2 hour examinations you may **not** leave temporarily.

5) For examinations longer than 2 hours you **may** leave temporarily but not in the first 2 hours or the last 30 minutes.

At the end of the examination

1) You must stop writing immediately – **if you continue writing after being told to stop, that is an assessment offence.**

2) Remain in your seat until you are told you may leave.

Question 1

a) Which one is the valid C programmer-created names. [2 marks]

A) the scanf B) scanf C) _scanf D) 4scanf

b) Which one is not the Built-in integer data type. [2 marks]

A) float B) char C) int D) long

c) Which operator statement is valid. [2 marks]

A) 6/=2 B) 6.5%2 C) a=(a+1)(b+2) D) -a>2

d) Determine the output of the following statement.

printf("%x\n%5.2f", 255, 3.1415); [2 marks]

A) ff\n3.14 B) FFn3.14 C) FF 3.14 D) ff
3.14

e) Determine the output of the following statement.

int a='a'; printf("%c", a+1); [2 marks]

A) 97 B) b C) 65 D) a

f) Determine the output of the following statement.

int x=10; int y=10; printf("%d", x==y); [2 marks]

A) 1 B) 0 C) TRUE D) FALSE

g) Determine the correct input of the following statement.

scanf("%d,%d", &x, &y); [2 marks]

A) 1 2 B) 1; 2 C) 1,2 D) 1.2

h) Determine the output of the following statement.

int x=10; int* p=&x; printf("%d", p); [2 marks]

A) The address of x B) the address of p C) unknown D) 10

i) What is the byte length of the string "a\\bcd\te" . [2 marks]

A) 6 B) 7 C) 8 D) 9

j) Which one is the incorrect statement. [2 marks]

A) char a=0xF1; B) char a='A'; C) char a=65; D) char a="A";

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		20 marks

Question marking: $\frac{}{2}+\frac{}{2}+\frac{}{2}+\frac{}{2}+\frac{}{2}+\frac{}{2}+\frac{}{2}+\frac{}{2}+\frac{}{2}+\frac{}{2}=\frac{}{20}$

Question 2

a) The output of the following program is _____ [3 marks]

```
unsigned int x=65535;
int y=-1;
printf("%d", x > y);
```

b) In order to express relationship x>y≥z, the expression in if(_) should be _____ [3 marks]

c) The output of the following program is _____ [3 marks]

```
int x=1;
int y=10;
if(x--) printf("%d", ++y);
```

d) The body of the loop will be executed _____times. [3 marks]

```
int x = 1253 % 10, y = 0;
do { x-=y+1; } while(x);
```

e) The output of the following program is _____ [3 marks]

```
int s = 0;
for (int i = 1; i < 20; i += 2)
    for (int j = 20; j >= 1; j -= 3)
        s++;
printf("%d", s);
```

f) The output of the following program is _____ [3 marks]

```
char str[]="ABCDEFG";
int i=4;
while(str[i])
{
   printf("%c", str[i]);
   i++;
}
```

g) The output of the following program is _____ [3 marks]

```
char ptr[] = "hello the world!";
for (int i = 3; i < 16; i += 2)
{
   printf("%c", *(ptr + i));
}
```

h) The value of M in the following program is _____ [3 marks]

```
int N[3][3] = {1,2,3,4,5,6,7,8,9};
int M = *(*(N+2)+1);
```

i) "char" consume 1 byte, "short" consume 2 bytes, "int" consume 4 bytes
The output of the following program is _____ [3 marks]

```
struct Data
{
   char   a;
   short  b;
   int    c;
};
printf("%d",sizeof(struct Data));
```

j) It is known that the ASCII code of the letter A is 65,
The output of the following program is _____ [3 marks]

```
char x = 'A';
printf ("%d", x+'e'-'a'-'C');
```

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	30 marks

Question marking: $\frac{}{3} + \frac{}{3} + \frac{}{3} + \frac{}{3} + \frac{}{3} + \frac{}{3} + \frac{}{3} + \frac{}{3} + \frac{}{3} + \frac{}{3} = \frac{}{30}$

Question 3

a) The following program takes user input the grade of each students, Then calculate the average scores. [6 marks]

```
int count;
float grade, total;
while (count < 30)
{
   printf("Enter a grade: ");
   scanf("%f", &grade);
   if (grade < 0 || grade > 100)
      continue;
   total = total + grade;
   count = count + 1;
}
```

i) Determine where the errors are and write down the correct codes. (3 marks)

ii) Write one line of source code to calculate and display the average scores with 2 decimal digits (such as 98.23) (3 marks)

b) The first printf function in the following program prints out 2579495328. Write the results of the other 2 printf functions. Suppose each integer takes 4 bytes. [6 marks]

```
int main()
{
   int n[5]={1, 2, 3, 4, 5};
   printf("%u\n", n);
   printf("%u %u\n", n+1, n+2);
   printf("%u %u %u\n",  *n,  *n+1,  *n+2);
   return 0;
}
```

c) The following program is used to find the maximum value in a two-dimensional array. Write down source codes to iterate through the array with "**for** loops" in the function "max". [6 marks]

```
int max(int *pMatrix, int rows, int colums)
{
      int(*p)[colums] = pMatrix;
      int m = (*p)[0];

      _____
      return m;
}

int main()
{
   int matrix[3][2] = {1, 2, 3, 4, 5, 6};
   int *pMatrix = matrix;
   int r = max(pMatrix, 3, 2);
   printf("%d", r);
   return 0;
}
```

d) Refactor the code using "if-else". [6 marks]

```
int x = 3;
switch (x)
{
case 1:
case 2:
   printf("1");
   printf("2");
   break;
case 3:
   printf("3");
   break;
case 4:
   printf("4");
   break;
default:
   printf("5");
}
```

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	24 marks

Question marking: $\frac{\;}{6}+\frac{\;}{6}+\frac{\;}{6}+\frac{\;}{6}=\frac{\;}{24}$

Question 4

Write a program to accept the user input "n", and calculate the number's factorial. [13 marks]

$$n! = \prod_{k=1}^{n} k \qquad \forall n \in \mathbb{N}.$$

$$n!=1\times2\times3\times\ldots\times n$$

a) Accept the user input "n" from the keyboard, check the input, prompts user to re-enter the number if $n<0$, until the input is correct. (5 marks)

b) Write a function named "factorial" that calculates the number's factorial using **recursion**.

The calculation formula： $0!=1$， $n!=(n-1)!\times n$ (5 marks)

c) Call the function "factorial", and print the result. (3 marks)

	Do not write in this column
	13 marks

Question marking: $\frac{}{5}+\frac{}{5}+\frac{}{3}=\frac{}{13}$

Question 5

There are five students, each student has 3 attributes (including student number, name, score), and the original data are stored in the disk file named "student".
This file contains M records (M<10), and each record represents one student's information. The record is whitespace separated. The sample is as follows: [13 marks]

2022001 May 88
2022002 Bob 91
2022003 Tony 95
2022004 Lee 70
2022005 Sail 86

a) Open the "student" file to read the records and use the array of structs to store the student's information. (5 marks)

b) Find the highest and lowest "score" . (5 marks]

c) Print the head and tail information using specified format as follows. (3 marks)

2022003 Tony 95
2022004 Lee 70

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	13 marks

Question marking: $\frac{}{5} + \frac{}{5} + \frac{}{3} = \frac{}{13}$

Appendix (remove if not applicable)

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Rough Working
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