

NAME: FIRST LAST [REDACTED]

SEAT 5 ROW

ES



NUMBER

5

1. (30 points) Answer the following questions.

(1) What is the value of $6/5 * r * r * r$ when variable r is 2 in C++?

$$1 * 2 * 2 * 2 = 8$$

$$1 * 2 * 2 * 2 =$$

$$4 * 2$$

$$1 * 8 = 8$$

8

(2) Declare function `foo` whose input parameter is `int` and return is a `string`. You just need to write the function header, no implementation is needed.

```
String foo(int num);
```

(3) Write code to generate a random int in [100, 300].

```
srand(time(NULL));
```

```
int value = rand() % (300 - 100 + 1) + 100; // generated random int
```

```
// value is random int (generated)
```

```
// stored in value
```

(4) Given array of strings as follows

```
string greetings[] = {"Hello", "Morning", "Hi"};
```


What is the value for `greetings[2].length()`?

`greetings[2]` → "Hi".length() = 2
 1 2

`greeting[2].length()` → 2

(5) Suppose we generate `a.out`, and we would like redirect the input from console to a file called `data.txt`. What is the command?

```
./a.out < data.txt
```

(6) What is the output of the following code?

```
int value = 1;
for (int i = 1; i < 6; i += 2)
    value *= i;
```

```
cout << value;
```

15

1 val * i = 1
3 1 * 3 = 3
5 3 * 5 = 15

1 1 * 1 = 1
↓
3 1 * 3 = 3
↓
5 3 * 5 = 15

(7) Write code to declare an array of int with size 100, call it scores. Initialize each element by 0.

```
int scores[100]; // declaration
for (int i = 0; i < 100; i++) { // initialize
    scores[i] = 0;
}
```

(8) What is the output of the following code?

```
for (int i = 0; i < 3; i++)
{
    for (int j = 0; j < 3; j++)
        if (i % 2 == j % 2)
            cout << "X";
        else cout << "O";

    cout << endl;
}
```

1 % 2 == 0 % 2
j = 0 1 2 1 == 0 false
0
2 % 2 == 0 % 2
0 == 0

1=0	X	O	X
1=1	O	X	O
1=2	X	O	X

(9) Write a condition to represent that both x and y are in the range of [0, 100], where both ends are included. Suppose x and y are properly declared and initialized.

((x <= 100) && (x >= 0)) && ((y <= 100) && (y >= 0))

* (10) Suppose n is an int, write code to throw away its last digit? For example, suppose n is 21, after your code, n should be 2.

n /= 10;

2. (30 points) Short answer questions

(2.1) Given three integers a, b and c, properly declared and initialized, write code to find out the largest number.

```
int max; // largest number
if ((a > b) && (a > c)) {
    max = a;
} else if ((b > a) && (b > c)) {
    max = b;
} else {
    max = c;
}
```

```
cout << "Largest number: ";
cout << max << endl;
```

(2.2) Read codes and write output.

```
void foo(int& a, int& b);
```

```
int main()
```

```
{
```

```
    int a = 11;
```

```
    int b = 6;
```

```
    foo(a, b);
```

```
    cout << "a = " << a << endl;
```

```
    cout << "b = " << b << endl;
```

6

11

```
    int c = 8;
```

```
    int d = 2;
```

```
    foo(c, d);
```

```
    cout << "c = " << c << endl;
```

```
    cout << "d = " << d << endl;
```

8

2

```
    return 0;
```

```
}
```

```
void foo(int& a, int& b)
```

```
{
```

```
    int temp;
```

```
    if (a % b != 0)
```

```
    {
```

```
        temp = a;
```

```
        a = b;
```

```
        b = temp;
```

```
    }
```

```
}
```

11, 6

(11 % 6 != 0) ✓

temp = 11

a = 6;

b = 11;

8, 2

(8 % 2 != 0) ✗

x = 8

b = 2

(2.3) Read code and answer questions.

```
string foo(int num)
{
    string result = "";
    do {
        result = to_string(num % 2) + result;
        //to_string convert an int to the corresponding string
        num /= 2;
    } while (num != 0);

    return result;
}
```

What are the return for foo(6) and foo(8)?

$(6 \% 2) + "" = "0"$
0
num /= 2 \Rightarrow 3

$(3 \% 2) + "0" = "10"$
1
num /= 2 \Rightarrow 1
 $(1 \% 2) + "10" = "110"$
1
1 / 2 = 0 //end

$\boxed{\text{foo}(6) = "110"}$

$(8 \% 2) + "" = "0"$
0
num /= 2 \Rightarrow 4
8 / 2

$(4 \% 2) + "0" = "00"$
0
num /= 2 \Rightarrow 2
4 / 2

$(2 \% 2) + "00" = "000"$
0
num /= 2 \Rightarrow 1
2 / 2

$(1 \% 2) + "000" = "1000"$
1
num /= 2 \Rightarrow 0 //end

$\boxed{\text{foo}(8) = "1000"}$

3. (20 points) Define a function, for a ^{param} given string str, return a string whose letters are the even-index letters in str with the same order. That is, suppose str is "abc", then return "ac". ₀₁₂

```
String even (String str) {  
    int len = str.length();  
    String output = "";  
    for (int i = 0; i < len; i += 2) {  
        output += str[i];  
    }  
    return output;  
}
```


4. (20 points) Write code inside main function, no need to include libraries.

(1) Enter two numbers a and b, which can contain decimals. \Rightarrow double

(2) If a is larger than or equal to b, then calculate and output to the screen result of $\sqrt{a-b} + b^a$. $a \geq b$ ($a \geq b$)

(3) Otherwise, calculate and print $\frac{a+5}{3(b-a)}$.

```
double result;
```

```
double a;
```

```
double b;
```

```
cout << "Enter a: ";
```

```
cin >> a;
```

```
cout << "\nEnter b: ";
```

```
cin >> b;
```

```
if (a >= b) {
```

```
    result = ((sqrt(a-b)) + (pow(b, a)));
```

```
} else {
```

```
    result = ((a+5) / (3 * (b-a)));
```

```
}
```

```
cout << "The result is: " << result << endl;
```