上 海 交 通 大 学 试 卷

（ 2018 -2019 Academic Year/ Fall Term）

Class No. Vg101 Student ID No._____ Name (Chinese or Pin Yin) _____

Course Title Introduction to Computers and Programming Grade _____

Midterm Exam for VG101
Introduction to Computers and Programming
Nov. 20th, 2018, Tuesday, 14:00-15:40

You are to abide by the University of Michigan-Shanghai Jiao Tong University Joint Institute (UM-SJTU JI) honor code. Please sign below to signify that you have kept the honor code pledge.

THE UM-SJTU JI HONOR CODE

I accept the letter and spirit of the honor code:

I have neither given nor received aid on this examination, nor have I concealed a violation of the Honor Code.
Signature: _____

题号 No										Total
得分 grade										
批阅人(流水阅卷教师)grader's signature										

General instructions

This exam is on the **C programming language**. Feel free to detach and use the scratch paper. Each question is marked with the number of points assigned to that problem. The total number of points is 100. Please note that the choice problems **might have multiple choices**, and **you can earn the points only when you answer all the correct choices**. The examination is **open-book**, and you may use any books, handouts, or course notes. However, you are not allowed to use any electronic devices including cell phones, computers or pads etc. Please also note that collaboration is not allowed. Good luck!

Exam Questions

1. (3) Which of the followings are keywords of the C language:

A) vg101 B) if C) struct
D) keyword E) typedef F) elseif

2. (3) Suppose all the variables below have been defined as the "int" type, which of the followings are valid statements:

A) `m = a > b? 1 : 0;` B) `a = b = 1;`
C) `a = 1, b = 2;` D) `0 = a;`
E) `a += b++;`

3. (3) Which of the following variable definitions are correct:

A) `int: a, b;` B) `int a; b;` C) `int a, *b, c;`
D) `int a = b = 0;` E) `int a b c;`

4. (3) Define

```
int arr[] = {4, 2, 5, 7, 3, 14, 6, 9, 11, 13};
```

Then the value of arr[arr[2]] is

A) 3 B) 2 C) 14 D) 5

5. (3) Define

```
int arr[480][640], *p = arr;
```

Please write an assignment statement to set the element arr[m][n] to be 0 using the pointer p. Here m (< 480) and n (< 640) are some integers.

Please write your answer here:

6. (5) What will be the output of the following program?

```
#include <stdio.h>
int fun(int *p)
{
    return (*p)+(*p)++;
}
int main()
{
    int k=3;
    printf("%d, %d\n", k, fun(&k));
    return 0;
}
```

Please write your answer here:

7. (10) What will be the output of the following program?

```
#include <stdio.h>
int main()
{
    char *s = "vg101[168]";
    int i, a=0;
    for (i=0; s[i]!='\0'; i++)
        if (i%2 == 0)
            if (s[i] >= '0' && s[i] <= '9')
                a += s[i] - '0' + 1;
    printf("a = %d\n", a);
    return 0;
}
```

Please write your answer here:

8. (10) Consider the following function, where sz1 and sz2 are the sizes of the arrays arr1 and arr2, respectively, and the size of arr3 is sz1+sz2:

```
void merge(int arr1[], int sz1,
        int arr2[], int sz2, int arr3[])
{
    int i = 0, j = 0, n = 0;
    while (i < sz1 && j < sz2)
    {
        while (arr1[i]<arr2[j] && i<sz1)
            arr3[n++] = arr1[i++];
        while (arr2[j]<arr1[i] && j<sz2)
     arr3[n++] = arr2[j++];
    }
    while (i<sz1) arr3[n++] = arr1[i++];
    while (j<sz2) arr3[n++] = arr2[j++];
}
```

(a) (5) Define three arrays:

```
int arr1[] = {5, 8 ,1};
int arr2[] = {2, 6, 3};
int arr3[6];
```

what is the result of the array arr3 after the execution of

```
merge(arr1, 3, arr2 , 3, arr3);
```

Please write your answer here:

(b) (5) Define three arrays:

```
int arr1[] = {1, 9 ,12};
int arr2[] = {2, 5, 11};
int arr3[6];
```

what is the result of the array arr3 after the execution of

```
merge(arr1, 3, arr2, 3, arr3);
```

Please write your answer here:

9. (15) List all the errors, if any, of the following C program. Then explain how to correct the errors.

```
#include <stdio.h>
#include <stdlib.h>
int main()
{
    int i, size, *p;
    printf("Input size: ");
    scanf("%d", size);
    p = (int*)malloc(size);
    for (i=1; i<=size; i++)
    {
        printf("Input p[%d]: ", i);
        scanf("%f", p[i]);
    }
    for (i=1; i<=size; i++)
        printf("p[%d] = %f\n", i, p[i]);
    return 0;
}
```

Please write your answer here:

10. (15) Write a function to convert a hexadecimal number to a decimal number. The function prototype should be:

```
int hex2dec(char *hexnum);
```

where hexnum points to a C-style string. Here we assume that the number is integer. For example, hex2dec("1A") will return 26.

Please write your answer here:

11. (15) Write a function to parse the C assignment statement which assigns an int value to a variable. The function prototype should be:

```
void ParseAssign(char *str, char *pVar, int *pVal);
```

where str points to an assignment statement (for example, "var = 1;"), pVar returns the variable name in a C-style string ("var" in this example), and pVal returns the variable value (1 in this example). For example,

ParseAssign("x = 3;", pVar, pVal);

will set the string that pVar points to as "x" and the value that pVal points to as 3. Here we assume that pVar points to a char array that have enough space to store the variable name. Also notice that you should remove the possible space characters in the input statement. You don't need to worry about invalid statements.

Please write your answer here:

Please write your answer here:

12. (15) The following is an algorithm to compute square roots: given a positive number *x*, let $a_1 = x$, and define a_2, a_3, … , by the formula

$$a_{n+1} = (a_n + x/a_n) / 2.$$

It can be proved that $a_n \rightarrow sqrt(x)$ as $n \rightarrow \infty$.

Now write a function with the following prototype:

```
double mysqrt(double x, double eps);
```

The function will return a_n according to the above algorithm and a_n satisfies $|a_n - a_{n-1}| <$ eps. Here you cannot use the sqrt function in <math.h>.

Scratch Paper

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