

I. Please answer the following questions:

- (1) [3%] Explain the meaning of the symbol '\*' in the following three C++ statements:  
"int \*a", "b = c \* d", "\*e = 5".
- (2) [4%] Discuss the difference between class and structure in C++ language.

II. Debugging:

- (5%) (1) Identify and correct the errors of the following to print the values 0 to 1.0, inclusive.  
for (y=0.0; y <= 1.0; y += 0.1)  
cout << y << " ";  
cout << endl;
- (5%) (2) This program segment should calculate the product of all the even integers between 10 and 1, inclusive.  
for (int i = 5; i > 1; i--) {  
int product = 2;  
product \*= i;  
}
- (5%) (3) Identify and correct the errors of the following code:  
void product(void)  
{  
int a;  
int b;  
int result;  
cout << "Enter two integers: ";  
cin >> a >> b;  
result = a \* b;  
cout << "Result is " << result;  
return result;  
}
- (5%) (4) The following segment should define two functions:  
void f2()  
{  
cout << "During call to f2.\n";  
void f3()  
{  
cout << "During call to f3.\n";  
}}

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III. Execution results:

- (1) [5%] What are the execution results of the following C++ program segment ?

```
for ( int i = 1; i <= 5; i++ ) {  
    switch ( i ) {  
        case 1:  
            cout << "The value of x is 1\n";  
            break;  
        case 3:  
            cout << "The value of x is 3\n";  
        default:  
            cout << "The value of x is neither 1 nor 3\n";  
    }  
}
```

- (2) [5%] What are the execution results of the following C++ program segment ?

```
int x;  
for ( x = 1; x <= 10; x++ ) {  
    if ( x == 7 )  
        break;  
    if ( x == 3 )  
        continue;  
    cout << x << " ";  
}  
cout << endl << "The final value of x is: " << x << endl;
```

- (3) [5%] What are the execution results of the following C++ program segment when function f1 is invoked?

```
void f1() ;  
{  
    int x = 5;  
    int &y = x;  
    f2( x );  
    cout << "The value of x is: " << x << endl;  
    y = 7;  
    cout << "The final value of x is: " << x << endl;  
}  
void f2( int x )  
{  
    x += 5;  
    cout << "The result of function call is: " << x << endl;  
}
```

- (4) [5%] What are the execution results of the following C++ program segment when function f3 is called twice?

```
void f3()
{
    static int x = 0;
    int y = 0;
    x++;
    ++y;
    cout << "The value of x is: " << x << endl;
    cout << "The value of y is: " << y << endl;
}
```

- (5) [5%] What are the execution results of the following C++ program segment?

```
void f4 (int);
void f5 (int &);
void f6 (int []);
int main ()
{
    int x4 = 1, x5 = 2;
    int x6[3] = {3, 2, 1};
    f4(x4);
    cout << "After f4, x4 = " << x4 << endl;
    f5(x5);
    cout << "After f5, x5 = " << x5 << endl;
    f6(x6);
    cout << "After f6, x6 = " << x6[0] << endl;
    return 0;
}

void f4 (int x) {
    x *= 3;
    cout << "During f4, x = " << x << endl;
}

void f5 (int &x) {
    x *= 3;
    cout << "During f5, x = " << x << endl;
}

void f6 (int x[]) {
    x[0] *= 3;
    cout << "During f6, x = " << x[0] << endl;
}
```

- (6) [10%] What are the execution results of the following C++ program segment?

```
int scmp (char *s1, char *s2) {
    while (*s1 != '\0' && *s2 != '\0') {
        if (s1[0] > s2[0]) return 1;
        else if (s1[0] < s2[0]) return -1;
        else {
            s1++;
            s2++;
        }
    } // end while
    if (*s1 == *s2) return 0;
    else if (*s1 == '\0') return -1;
    else return 1;
}

int main ()
{
    const int size = 4;
    char *suit[4] = {"Hearts", "Diamonds", "Clubs", "Spades"};
    int pass, i;
    char *hold;

    for (pass = 0; pass < size - 1; pass++) {
        for (i=0; i < size - 1; i++) {
            if (scmp(suit[i], suit[i+1]) < 0) {
                hold = suit[i];
                suit[i] = suit[i+1];
                suit[i+1] = hold;
            } // end if
        }
        cout << "In round " << pass << " : \n";
        for (i=0; i < size; i++) {
            cout << "s[" << i << "] = ";
            cout << suit[i] << endl;
        } // end for
    } // end for pass
    return 0;
}
```

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(7) [8%] What are the execution results of the following C++ program segment ?

```
class M {
public:
    M(int = 0, int = 1);
    int mystery(int);

private:
    int data;
    int number;
}; // end class M

M::M(int q, int n) {
    data = q;
    number = n;
} //end class M constructor

int M::mystery(int q) {
    data += q;
    return data*number;
} // end function mystery

int main()
{
    M Obj1, Obj2(3, 5);
    M *Ptr1 = &Obj1;

    cout << Ptr1->mystery(20) << endl;
    cout << Obj2.mystery(10) << endl;
    return 0;
} // end main
```

IV. [10%] Write a function **min** that prints and returns the minimum of its five integer parameters using C++ language.

V. Given the following class definition, please complete the following functions using C++ language.

```
class ListNode {
public:
    ListNode();
private:
    int data;
    ListNode *next;
};
```

- (1) [10%] Please complete the function **void insert(ListNode \*head, ListNode \*newnode)** that inserts a new node pointed by *newnode* into the front of the link list pointed by *head*.
- (2) [10%] Please complete the function **ListNode\* search(ListNode \*head, int key)** that searches the nodes in the link list pointed by *head*. If the *data* of a node equals to *key*, this function will return the pointer of this node; otherwise, it will return NULL.