

TEST CSIE 4 – Year 2020, Summer Admission



1. What will be the output of the following C application?

```
#include <stdio.h>

void main()
{
    char a = 97;
    char* pa = NULL;

    pa = &a;
    *pa = *pa - 1;
    printf("\na = %d, *pa = %X", a, *pa);
}
```

- a) a = 96, *pa = 60
- b) a = 97, *pa = 96
- c) a = 97, *pa = 96
- d) a = 60, *pa = 60

Correct: a

2. What will be the content of the file test.bin as hexa-decimal pairs of figures (1 pair means 1 Byte) after running the following C application (little-endian approach)?

```
#include <stdio.h>

void main()
{
    long int buffer = 0x12345678;
    FILE *fp;

    fp = fopen("test.bin", "wb");
    fwrite(&buffer, sizeof(char), 3, fp);

    fclose(fp);
}
```

- a) 785634
- b) 123456
- c) 12345678
- d) 78563412

Correct: a

3. What will be the output of the following C application?

```
#include <stdio.h>

void f(char *x, int y)
{
    y++;
    *x += y;
}

void main()
```

```

{
    char a = 0x65;
    int b = 1;

    f(&a, b);

    printf("%X %d", a, b);
}

```

- a) 67 1
- b) 65 1
- c) 65 2
- d) 67 2

Correct: a

4. What will be the output of the following C++ application?

```

#include <stdio.h>

void f(char *x, int &y)
{
    y++;
    *x += y;
}

void main()
{
    char a = 65;
    int b = 1;

    f(&a, &b);

    printf("%d %d", a, b);
}

```

- a) Compilation error message
- b) 67 1
- c) 67 2
- d) 65 2

Correct: a

5. What will be the output of the following C application?

```

#include <stdio.h>

void main()
{
    char pattern[] = "test";
    int found = 0, i = 0;

    while (pattern[i++] != 0)
    {
        found++;
    }
}

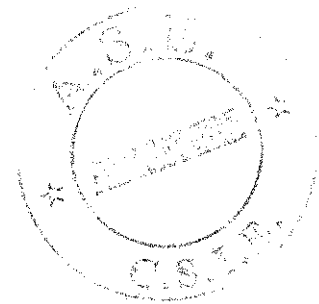
```

```

    printf("%d", found);
}

```

- a) 4
- b) 3
- c) 5
- d) 0



Correct: a

6. What is the right choice to make a valid allocation and use of the heap memory in C++ code?

- a)


```

char* str = new char[strlen("Exam")+1];
strcpy(str, "Exam");

```
- b)


```

char* str = new char[strlen("Exam")+1];
strcpy(str, "Exam");

```
- c)


```

char* str = new char[strlen("Exam+1")];
strcpy(str, "Exam");

```
- d)


```

char str = new char[strlen("Exam")];
strcpy(str, "Exam");

```

Correct: a

7. What will be the output of the following C application?

```

#include <stdio.h>
#include <string.h>

void main()
{
    char str[] = "A string";

    printf("%d %d", strlen(str), sizeof(str));
}

```

- a) 8 9
- b) 8 8
- c) 9 9
- d) 9 8

Correct: a

8. In the following C++ application, how many times the destructor of the class `Student` is called?

```

#include <stdio.h>

class Student
{
private:

```

```

    int age;
    char* name;
public:
    Student(int v = 0)
    {
        this->age = v;
        this->name = NULL;
    }
};

void main()
{
    Student x;
    int age1 = 21; int age2 = 20;

    Student s1(age1);
    Student s2(age2);
    Student s3 = s1;
    Student s4;
}

```

- a) 5 times
- b) 3 times
- c) 4 times
- d) There is no destructor attached to the class **Student**

Correct: a

9. In the following C++ application, how many times the operator = is called?

```

#include <stdio.h>
#include <string.h>

class Student
{
public:
    int age;
    char* name;
public:
    Student(int v = 0, char* sname = NULL)
    {
        this->age = v;
        if (sname != NULL)
        {
            this->name = new char[strlen(sname) + 1];
            strcpy(this->name, sname);
        }
        else
            this->name = NULL;
    }

    Student(const Student& s)
    {
        this->name = new char[strlen(s.name) + 1];
        strcpy(this->name, s.name);
        this->age = s.age;
    }

    void operator=(Student& s)
    {
        if (this->name)

```

```

        delete[] this->name;
        this->name = new char[strlen(s.name) + 1];
        strcpy(this->name, s.name);
        this->age = s.age;
    }

    ~Student()
    {
        if (this->name)
            delete[] this->name;
    }
};

void main()
{
    int age1 = 21; int age2 = 20;

    Student s1(age1, "John");
    Student s2(age2, "James");
    s1 = s2;
    Student s3 = s1;
    Student s4;
    s4 = s2;
}

```

- a) 2 times
- b) 3 times
- c) 1 single time
- d) No call to overloaded operator =

Correct: a

10. In C++, the copy constructor is called when

- a) Building an object taking over another one with the same type, passing an object by value as input parameter to a function/method, returning an object by value as result from a function/method
- b) Two objects of the same type are involved in an assignment operation
- c) Building an object taking over another one with the same type, passing an object by reference as input parameter to a function/method, returning an object by value as result from a function/method
- d) Building an object taking over another one with the same type where there are only run-time attributes in heap memory

Correct: a

11. What will be the output of the following C++ application?

```

#include <iostream>
using namespace std;

class MyClass {
public:
    static int n;

    MyClass()
    {
        n++;
    }
}

```

```

    ~MyClass()
    {
        n--;
    }
};

int MyClass::n = 0;

void main() {
    MyClass mc1, mc2, *pmc;
    pmc = new MyClass;

    {
        MyClass tmc;
    }

    cout << MyClass::n << endl;

    delete pmc;
}

```

- a) 3
- b) 4
- c) 2
- d) 1

Correct: a

12. What will be the output of the following C++ application?

```

#include <iostream>
using namespace std;

class MyClass {
    char x;
public:
    static int n;

    MyClass(char in = '0')
    {
        this->x = in;
        n++;
    }

    ~MyClass()
    {
        n--;
    }

    void change(char in)
    {
        this->x += in;
    }

    char getX()
    {
        return this->x;
    }
};

```

106

```
int MyClass::n = 0;

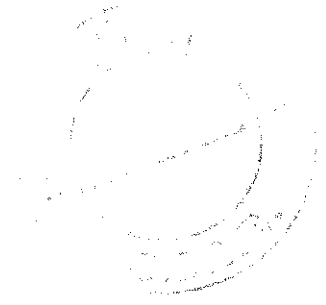
void change(MyClass& obj, char in)
{
    obj.x -= in;
}

void main() {
    MyClass mc1(67), mc2('a'), *pmc;
    pmc = new MyClass;

    change(mc1, 2);

    printf("%d\n", mc1.getX());

    delete pmc;
}
```



- a) Compilation error message
- b) 67
- c) 65
- d) 69

Correct: a

13. What will be the output of the following C++ application?

```
#include <iostream>
using namespace std;

class A
{
public:
    void print()
    {
        cout << "Class A" << endl;
    }
};

class B
{
public:

    B(const A& x) {}
    B() {}

    B& operator= (const A& x) { return *this; }
    operator A() { return A(); }

    void print()
    {
        cout << "Class B" << endl;
    }
};

void main()
{
    A ob_A;
    B ob_B;
```

```

    ob_B = ob_A;
    ob_B.print();

    ob_A = ob_B;
    ob_A.print();
}

```

- a) Class B
Class A
- b) Class B
Class B
- c) Class A
Class A
- d) Compilation error message

Correct: a

14. What will be the right statement to be added for the following C++ application?

```

#include <iostream>
using namespace std;

class String
{
private:
    int length;
    char* ps;
public:
    String();
    String(const char*);
    ~String();

    const String& operator=(const String&);
    const String& operator+(const String&);
};

String::String() {
    this->length = 0;
    this->ps = NULL;
}

String::String(const char* str){
    this->length = strlen(str);
    this->ps = new char[this->length + 1];
    strcpy(this->ps, str);
}

String::~String() {
    if (this->ps) delete[] this->ps;
    this->length = 0;
    this->ps = NULL;
}

const String& String::operator+(const String& strSrc) {
    String* tempS;
    tempS = new String();
    tempS->length = this->length + strSrc.length;
    if (tempS->ps != NULL) delete[] tempS->ps;
}

```


132

```

tempS->ps = new char[tempS->length + 1];
strcpy(tempS->ps, this->ps);
strcat(tempS->ps, strSrc.ps);
return (*tempS);
}

const String& String::operator=(const String& strSrc) {
    if (this != &strSrc) {
        this->length = strSrc.length;
        if (this->ps) delete[] this->ps;
        this->ps = new char[this->length + 1];
        strcpy(this->ps, strSrc.ps);
    }
    return *this;
}

void main()
{
    String s1("The first string ");
    String s2("and the second one.");
    String s3;

    // add new statements here
}

```

- a) s3 = s1 + s2;
- b) s3 = s1 + "plus a new string";
- c) s3 = "The final string " + s2;
- d) Compilation error message

Correct: a

15. In the following C++ application, how many times the operator `delete` is called?

```

#include <stdio.h>
#include <string.h>

class Student
{
public:
    int age;
    char* name;
public:
    Student(int v = 0, char* sname = NULL)
    {
        this->age = v;
        if (sname != NULL)
        {
            this->name = new char[strlen(sname) + 1];
            strcpy(this->name, sname);
        }
        else
            this->name = NULL;
    }

    Student(const Student& s)
    {
        this->name = new char[strlen(s.name) + 1];
        strcpy(this->name, s.name);
        this->age = s.age;
    }
}

```

```

Student operator+(Student& s)
{
    Student tstud;
    tstud.age = (this->age + s.age) / 2;
    tstud.name = new char[strlen(this->name) + strlen(s.name) + 1];
    strcpy(tstud.name, this->name);
    strcpy(tstud.name + strlen(this->name), s.name);

    return tstud;
}

~Student()
{
    if (this->name)
        delete[] this->name;
}

void operator=(Student& s)
{
    if (this->name)
        delete[] this->name;
    this->name = new char[strlen(s.name) + 1];
    strcpy(this->name, s.name);
    this->age = s.age;
}

};

void main()
{
    int age1 = 21; int age2 = 20;

    Student s1(age1, "John");
    Student s2(age2, "James");
    s2 = s1 + s2;
    Student s3 = s1;
    Student s4;
}

```

- a) 6 times
- b) 5 times
- c) 7 times
- d) 4 times

Correct: a

1. What will display the following Java code?

```

import java.util.HashMap;
import java.util.Map;

final class PhoneNumber {
    private final short areaCode, prefix, lineNum;

    public PhoneNumber(int areaCode, int prefix, int lineNum) {
        this.areaCode = rangeCheck(areaCode, 999, "area code");
        this.prefix = rangeCheck(prefix, 999, "prefix");
        this.lineNum = rangeCheck(lineNum, 9999, "line num");
    }

    private static short rangeCheck(int val, int max, String arg) {
        if (val < 0 || val > max)
            throw new IllegalArgumentException(arg + ": " + val);

        return (short) val;
    }

    @Override
    public boolean equals(Object o) {
        if (o == this)
            return true;

        if (!(o instanceof PhoneNumber))
            return false;

        PhoneNumber pn = (PhoneNumber) o;
        return pn.lineNum == lineNum && pn.prefix == prefix && pn.areaCode ==
areaCode;
    }

    @Override public int hashCode() { return 42; }
}

```

```

public class MainTest2 {
    public static void main(String[] args)
    {
        Map<PhoneNumber, String> m = new HashMap<>();
        m.put(new PhoneNumber(707, 867, 5309), "Jenny");
        m.put(new PhoneNumber(708, 967, 5309), "Mark");
        String val1 = m.get(new PhoneNumber(707, 867, 5309));
        String val2 = m.get(new PhoneNumber(708, 967, 5309));
        System.out.println("val1 = " + val1 + ", val2 = " + val2);
    }
}

```

- a) val1 = Jenny, val2 = Mark
- b) val1 = Jenny, val2 = Jenny
- c) Nothing because of compilation error
- d) Nothing because of runtime error

Correct: a

2. What will display the following Java code?

```

import java.util.Arrays;
import java.util.EmptyStackException;

class Stack implements Cloneable {
    private Object[] elements;
    private int size = 0;
    private static final int DEFAULT_INITIAL_CAPACITY = 5;
    public Stack() {
        this.elements = new Object[DEFAULT_INITIAL_CAPACITY];
    }
    public void push(Object e) {
        ensureCapacity();
        elements[size++] = e;
    }
    public Object pop() {
        if (size == 0)
            throw new EmptyStackException();
        Object result = elements[--size];
        elements[size] = null; // Eliminate obsolete reference
        return result;
    }
    private void ensureCapacity() { // Ensure space for at least one more
element.
        if (elements.length == size)
            elements = Arrays.copyOf(elements, 2 * size + 1);
    }
    @Override
    protected Object clone() throws CloneNotSupportedException {
        return super.clone();
    }
    @Override public String toString() {
        StringBuffer r = new StringBuffer();
        r.append("[ "+elements[0]);
        int i = 1;
        for(Object o : elements) {
            if(i > 1) r.append(", "+o);
            i++;
        }
        r.append("]");
        return r.toString();
    }
}

public class MainTest2 {
    public static void main(String[] args)
    {
        Stack st1 = new Stack();
        st1.push("1"); st1.push("5"); st1.push("9");
        try {
            Stack st2 = (Stack) st1.clone();
            String s = (String)st1.pop();
            System.out.println("st1 = " + st1.toString() + ", st2 = " + st2.toString());
        } catch (CloneNotSupportedException e) {
            e.printStackTrace();
        }
    }
}

a) st1 = [1, 5, null, null, null], st2 = [1, 5, null, null, null]

```

- 139
- b) st1 = [1, 5], st2 = [1, 5]
 - c) Nothing because of compilation error
 - d) st1 = [1, 5], st2 = [1, 5, 9]

Correct: a

3. What will display the following Java code?

```
import java.util.Arrays;

public class MainTest2 {
    public static void main(String... args) {
        int sum = Arrays.stream(new int[]{1, 2, 11})
            .filter(i -> i >= 2)
            .map(i -> i * 3)
            .sum();
        System.out.printf("sum = %d", sum);
    }
}
```

- a) sum = 39
- b) sum = 42
- c) Nothing because of compilation error
- d) Nothing because of runtime error

4. What will display the following Java code?

```
interface FIFact {
    int getValue(int num);
}

public class MainTest2 {
    public static void main(String... args) {
        FIFact myFactorialFunc = (num) -> {
            int fact = 1;
            for(int i = 1; i <= num; i++){
                fact = i * fact;
            }
            return fact;
        };
        System.out.println("Factorial is " + myFactorialFunc.getValue(4));
    }
}
```

- a) factorial is 24
- b) factorial is 6
- c) Nothing because of compilation error
- d) Nothing because of runtime error

Correct: a

5. What will display the following Java code?

```
class Period {
    private final Date start;
    private final Date end;
    public Period(Date start, Date end) {
        if (start.compareTo(end) > 0)

```

```

        throw new IllegalArgumentException(start + " after " + end);

        this.start = start;
        this.end = end;
    }
    public Date start() {
        return start;
    }
    public Date end() {
        return end;
    }
    @Override
    public String toString() {
        return new String("start = "+start+", end = "+end);
    }
}

```

```

public class MainTest2 {
    public static void main(String[] args) {
        Date start = new Date();
        Date end = new Date();
        Period p1 = new Period(start, end);
        Period p2 = new Period(start, end);
        System.out.println("p1 equals p2 - " + (p1.equals(p2)));
        end.setYear(78);
        System.out.println("p1 == p2 - " + (p1 == p2));
    }
}

```

- a) p1 equals p2 - false \n p1 == p2 - false
- b) p1 equals p2 - true \n p1 == p2 - false
- e) Nothing because of compilation error
- f) Nothing because of runtime error

Correct: a

6. What will display the following Java code?

```

class MyGen<T>
{
    T var;
    void set(T var)
    {
        this.var = var;
    }
    T get()
    {
        return var;
    }
    @SuppressWarnings("unchecked")
    void set(String s) {
        var = (T) s;
    }
}

public class MainTest2 {
    public static void main(String[] args) {

```

```

        MyGen<Double> m = new MyGen<Double>();
        m.set("2034.5");
        System.out.println(m.get());
    }
}

```

- a) 2034.5
- b) Nothing because of compilation error
- c) 2034
- d) Nothing because of runtime error

Correct: a

7. What will display the following Java code?

```

import java.util.List;
import java.util.ArrayList;

public class MainTest2 {
    public static void main(String[] args) {
        List<Integer> marks = new ArrayList<Integer>();
        marks.add(34);
        marks.add(32);
        for (Integer x : marks) {
            System.out.print(x + " ");
        }
        System.out.print(" # ");
        marks.add(1, 30);
        for (Integer x : marks) {
            System.out.print(x + " ");
        }
        System.out.print(" # ");
        System.out.print(" " + marks.get(2));
        System.out.print(" " + marks.indexOf(0));
        System.out.print(" " + marks.remove(2));
        System.out.print(" # ");
        for (Integer x : marks)
        {
            System.out.print(" " + x);
        }
        System.out.println();
    }
}

```

- a) 34 32 # 34 30 32 # 32 -1 32 # 34 30
- b) Nothing because of compilation error
- c) 34 32 # 34 30 32 # 32 -1 32 # 34 32 30
- d) Nothing because of runtime error

Correct: a

8. What will display the following Java code?

```

import java.util.List;
import java.util.ArrayList;

public class MainTest2 {
    public static void main(String[] args) {

```

```

        List<Integer> marks = new ArrayList<Integer>();
    try {
        marks.add(91); marks.add(73); marks.add(21);
        marks.remove(73);
    } catch(Exception e) {}
    for (Integer x : marks) {
        System.out.print(x + " ");
    }
}

```

- a) 91 73 21
- b) compilation error
- c) 91 21
- d) runtime error

Correct: a

9. What will display the following Java code?

```

import java.util.Arrays;
import java.util.List;

public class MainTest2 {
    public static void main(String[] args)
    {
        List<Integer> numbers = Arrays.asList(10, 25, 35, 40);
        int factor = 2;

        System.out.println(
            numbers.stream().filter(number -> number % 2 == 0)
                .mapToInt(e -> e * factor).sum());
    }
}

```

- a) 100
- b) Nothing because of compilation error
- c) 220
- d) Nothing because of runtime error

Correct: a

10. What will display the following Java code, if the given input in console is "Hello Test!"?

```

import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;

public class MainTest2 {
    public static void main(String[] args)
    {
        String str = "";
        BufferedReader obj = new BufferedReader(new InputStreamReader(System.in));
        do {
            try {
                str = (String) obj.readLine();
            } catch (IOException e) {
                e.printStackTrace();
            }
        }
    }
}

```


101

```
        System.out.print(str);
    } while(!str.equals("strong"));
}
}
```

- a) Hello Test
- b) Nothing because of compilation error
- c) Hello strong
- d) Nothing because of runtime error

11. What will display the following Java code?

```
import java.io.File;

public class MainTest2 {
    public static void main(String[] args)
    {
        String name = null;
        File file = new File(".", name);
        if(file.exists())
            System.out.print("Exp01");
        else
            System.out.print("Exp02");
    }
}
```

- a) runtime error
- b) compilation error
- c) Exp01
- d) Exp02

Correct: a

12. How will be displayed the "car1.txt", file after running the following Java code?

```

import java.io.ObjectOutputStream;
import java.io.FileOutputStream;
import java.io.IOException;

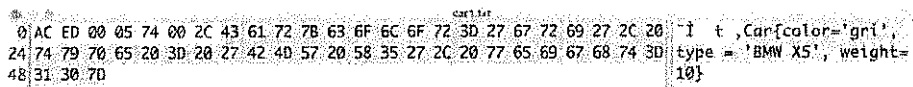
class Car {
    private int weight = 0;
    private String type = "";
    private String color = "";

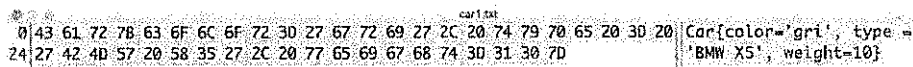
    public Car(int weight, String type, String color){
        this.weight = weight; this.type = type; this.color = color;
    }
    public Integer getWeight() { return weight; }
    public void setWeight(Integer weight) { this.weight = weight; }
    public String getType() { return type; }
    public String getColor() { return color; }
    public void setColor(String color) { this.color = color; }
    public String toString() {
        return "Car{" + "color='" + color + "'
            + ", type = '" + type + "', weight=" + weight + '}';
    }
}

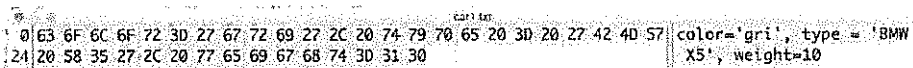
public class MainTest2 {
    public static void main(String[] args)
    {
        try (FileOutputStream fos = new FileOutputStream("car1.txt");
            ObjectOutputStream out = new ObjectOutputStream(fos);) {

            Car c = new Car(10, "BMW X5", "gri");
            out.writeObject(c);
        } catch (IOException e) {
            e.printStackTrace();
        }
    }
}

```

a. 

b. 

c. 

d. The source code is incorrect and it cannot be compiled

Correct: a

13. How will be in HEX displayed the "car.txt" file after running the following Java code?

```

import java.io.DataOutputStream;
import java.io.FileOutputStream;
import java.io.IOException;

class Car {
    private int weight = 0;
    private String type = "";
    private String color = "";

    public Car(int weight, String type, String color){
        this.weight = weight; this.type = type; this.color = color;
    }
    public Integer getWeight() { return weight;}
    public void setWeight(Integer weight) { this.weight = weight; }
    public String getType() { return type; }
    public String getColor() { return color; }
    public void setColor(String color) { this.color = color; }
    public String toString() {
        return "Car{" + "color='" + color + "'
            + ", type = '" + type + "', weight=" + weight + '}';
    }
}

public class MainTest2 {
    public static void main(String[] args)
    {
        try (FileOutputStream fos = new FileOutputStream("car.txt");
            DataOutputStream out = new DataOutputStream(fos);) {

            Car c = new Car(1024, "BMW X5", "black");
            out.writeInt(c.getWeight());
            out.writeUTF(c.getType());
            out.writeUTF(c.getColor());

        } catch (IOException e) {
            e.printStackTrace();
        }
    }
}

```

- a. 00 00 04 00 00 06 42 4D 57 20 58 35 00 05 62 6C 61 63 6B
- b. 00 04 31 30 32 34 00 06 42 4D 57 20 58 35 00 05 62 6C 61 63 6B
- c. 00 00 09 C4 00 00 06 42 4D 57 20 58 35 00 05 62 6C 61 63 6B
- d. 00 04 00 00 00 06 42 4D 57 20 58 35 00 05 62 6C 61 63 6B

Correct: a

14. What will display the following Java code?

```

class A
{
    int i = 105;
}

```

```

class B extends A
{
    int i = 207;
}

public class MainTest2
{
    public static void main(String[] args) {
        A a = new B();
        System.out.println(a.i);
    }
}

```

- a) 105
- b) compilation error
- c) 207
- d) runtime error

Correct: a

15. What will display the following Java code?

```

class A
{
    public A() {
        System.out.print("# Class A Constructor");
    }
}

class B extends A
{
    public B() {
        System.out.print("# Class B Constructor");
    }
}

class C extends B
{
    public C() {
        System.out.print("# Class C Constructor");
    }
}

public class MainTest2
{
    public static void main(String[] args)
    {
        C c = new C();
        c.toString();
    }
}

```

- a) # Class A Constructor# Class B Constructor# Class C Constructor
- b) compilation error
- c) # Class C Constructor# Class B Constructor# Class A Constructor
- d) runtime error

Correct: a