T.C.
İSTANBUL ÜNİVERSİTESİ
Mühendislik Fakültesi
Bilgisayar Mühendisliği Bölümü

Dersin Kodu: BIMU1055	**Dersin Adı: INTRODUCTION TO PROGRAMMING**
Dersin Öğretim Üyesi: Dr. Öğr. Ü. Özgür Can TURNA	**Sınav Türü: Make-Up**
Sınav Tarihi ve Süresi: 12.06.2018 (70 dk)	**Öğrenci No:**
Öğrenci Ad-Soyad:	**Öğrenci İmzası:**

1. (40) Write the output of the program below. (Use brackets. Hınt: numbers 0-9 are between 48-57 in ASCII table)

```
#include <iostream>
#include <string>
using namespace std;
char arr[] = { 'C' , 'H' , 'K' , 'O' };
int Weight[4];

int par(const char *p, int s) {
	int res = 0;
	for (int i = 0; i < s; i++)	{	res = res * 10 + p[i] - 48;	}
	return res;
}

void parser(string str)
{
	int i,j, startP = 0;
	for (i = 1; i < str.size(); i++)
	{
		if (str[i] > '9') {
			for (j = 0; j < 4; j++)	{
				if (str[i] == arr[j])	{
					Weight[j] = par(str.c_str() + startP, i - startP);
					startP = i + 1;
					break;
				}
			}
		}
	}
}

bool isE(const int *p, int s) {
	for (int i = 0; i < s; i++)
		if (p[i] != 0)
			return false;
	return true;
}

void Writer(int *p, int s) {
	while(isE(p,s) == false)
	for (int i = s-1; i >= 0; i--) {
		if (p[i] != 0) {
			p[i] --;
			cout << arr[i % 4];
		}
	}
}

int main()  {
	cout << par("12345678", 4) << endl;	// 5 POINTS  (a)
	cout << isE(new int[2], 2) << endl;	// 5 POINTS  (b)
	parser("3K2H4C1O");
	Writer(Weight, 4);			// 15 POINTS  (c)
	cout << endl;
	int a[] = { 1 ,2 , 1, 2, 1, 2, 1, 2};
	Writer(a, 8);				// 15 POINTS  (d)
	return 0;
}
```

Write your answer here use each line separate
a. 1234
b. 0
c. OKHCKHCKCC
d. OKHCOKHCOHOH

2. (20p) Write a new function(s) for the program in the first question to take outputs as in examples below.

```
Ex:1    INPUT :   3K 2H 1O
        OUTPUT:   KKKHHO
Ex:2    INPUT :   4K 13C 1H
        OUTPUT:   KKKKCCCCCCCCCCCCCH
```

```
void parserAndWriter2(string str)
{
	int i, j, startP = 0, weight_next;
	for (i = 1; i < str.size(); i++)
	{
		if (str[i] == ' ')   //SPACE CONDITION
		{
			startP = i + 1;  //Starting point of number should be than.
			continue;
		}
		else if (str[i] > '9') {
			for (j = 0; j < 4; j++)
			{
				if (str[i] == arr[j])
				{
					weight_next = par(str.c_str() + startP, i - startP);
					startP = i + 1;
					while (weight_next > 0)
					{
						cout << str[i];
						weight_next--;
					}
					break;
				}
			}
		}
	}
}
```

3. (20p) Write the output of the program below.

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

class A {
public:
	static int a;
	A(int x) { a = a + x; }
	A() { a++; }
};
class B : public A{
public:
	int b;
	B(int x): b(x){}
};

class C : public B {
protected:
	int c;
	static int sc;
	C(int x) : B(x),c(x*2) { }
public:
	C(): C(sc++) { }
	int getC() { return c; }
};
int C::sc = 1;
int A::a = 0;
enum types{ AA ,BB, CC};
int main() {
	int art[5] = { 0 } , i;
	A *arr[5];
	string str = "ABCBA";
	for (i = 0; i < 5; i++)
	{
		if (str[i] == 'A') { art[i] = AA; arr[i] = new A(i); }
		if (str[i] == 'B') { art[i] = BB; arr[i] = new B(i); }
		if (str[i] == 'C') { art[i] = CC; arr[i] = new C; }
	}

	cout << "NUM   a   b    c" << endl;
	for (i = 0; i < 5; i++)
	{
		switch (art[i])
		{
		case AA:
			cout << i << "     " << arr[i]->a << endl;
			break;
		case BB:
			cout << i << "     " << arr[i]->a << "   " << ((B*)arr[i])->b << endl;
			break;
		case CC:
			cout << i << "     " << arr[i]->a << "   " << ((B*)arr[i])->b <<
				"    " << ((C*)arr[i])->getC() << endl;
			break;
		}
	}
	return 0;
}
```

NUM	a	b	c
0	7		
1	7	1	
2	7	1	2
3	7	3	
4	7		

4. (20p) Write necessary code blocks to make the given code work without errors.

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

template<typename T>
T funcT(T a, T b, T c)
{
	try {
		if (c < a) return (a + b) / c;
		else return a;
	}
	catch (std::exception)
	{
		return c;
	}
}

class MyClass{
public:
	double val;
	MyClass(double d) :val(d) {}
	MyClass() { val = 0; }
	MyClass operator + (MyClass & op2) { MyClass t; t.val = val + op2.val; return t; }
	MyClass operator / (MyClass & op2) { MyClass t; t.val = val / op2.val; return t; }
	bool operator < (MyClass & op2) { return val < op2.val; }
};

int main()
{
	cout << funcT(5, 10, 2) << endl; //output 7
	cout << funcT(MyClass(5), MyClass(10), MyClass(2)).val << endl; //output 7.5
	return 0;
}
```

5. (5p) For the program in question 4. If we have this code line in main what will the output be? Explain why in one sentence.

```
	MyClass A(5), B(10), C;
	cout << funcT(A, B, C).val << endl;
```

Result is zero (0). Because constructor of MyClass without parameter assign zero to val and the code includes a division by zero error. This error caught by try catch block and val of C returned.