
UNIVERSITI SAINS MALAYSIA

First Semester Examination
2011/2012 Academic Session

January 2012

CPT111 – Principles of Programming
[Prinsip Pengaturcaraan]

Duration : 2 hours
[Masa : 2 jam]

INSTRUCTIONS TO CANDIDATE:

[ARAHAN KEPADA CALON:]

- Please ensure that this examination paper contains **THREE** questions in **FIFTEEN** printed pages before you begin the examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **TIGA** soalan di dalam **LIMA BELAS** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

- Answer **ALL** questions.

*[Jawab **SEMUA** soalan.]*

- You may answer the questions either in English or in Bahasa Malaysia.

[Anda dibenarkan menjawab soalan sama ada dalam bahasa Inggeris atau bahasa Malaysia.]

- In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi bahasa Inggeris hendaklah diguna pakai.]

1. (a) Write the following arithmetic expression in C++:

$$\frac{4}{3(r+34)} - 9(a+bc)^4 + \frac{3+d(2+a)}{\sqrt{a+bd}}$$

(8/100)

- (b) Write **four (4)** different but equivalent C++ statements to minus 1 from a variable `Num`.

(8/100)

- (c) Assume that `int a = 1` and `double d = 1.0`, and that each expression is independent. What are the results of the following expressions?

(i) `a = 5 + 5 * 2 % a--;`

(4/100)

(ii) `a = 4 + 1 + 4 * 5 % (++a + 1);`

(4/100)

(iii) `d += 1.5 * 3 + (++d);`

(4/100)

(iv) `d -= 1.5 * 3 + d++;`

(4/100)

- (d) What is wrong in the following code? Rewrite the code correctly using a `switch` statement in C++.

```

if (score >= 60.0)
    grade = 'D';
else if (score >= 70.0)
    grade = 'C';
else if (score >= 80.0)
    grade = 'B';
else if (score >= 90.0)
    grade = 'A';
else
    grade = 'F';

```

(28/100)

(e) Write in two different but equivalent ways for the algorithm below using the following C++ keywords:

(i) `if-else` (20/100)

(ii) `switch` (20/100)

Algorithm:

```

if value of grade is
A, add 10 to sum
B, add 7 to sum
C, add 5 to sum
D, add 3 to sum
F, print student is on probation
all other value print an error "invalid grade" message

```

2. (a) Briefly explain the differences between the following terms:

(i) `break` and `continue` statements. (10/100)

(ii) `while` loop, `do while` loop and `for` loop. (10/100)

(b) Write a program that reads in an integer value for n and then sums the integers from n to $2*n$ if n is non-negative, or from $2*n$ to n if n is negative.

(i) Write the code using only `for` loop. (10/100)

(ii) Write the code using only `while` loop. (10/100)

(c) Explain what will happen when the following code runs:

(i)

```

int i=2;
while (i<6);
{
    cout<<"Some even numbers: "<<i<<i+2<<i+4<<endl;
    ++i;
}

```

 (10/100)

```
(ii) int i;
      do
      {
          cout<<"\nWould you like to go again? 1 = yes 0 = no";
          cin>>i;
      }while(i=1);
```

(10/100)

(d) What is the output of the following program?

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

int main ()
{
    const int n = 5;
    for (int i=0;i<=2*n;i++)
    {
        for (int j=0;j<=2*n;j++)
            if(i<=n)
                if (j<n-i||j>n+i)
                    cout<<" ";
                else
                    cout<<"*";
            else
                if (j<i-n||j>3*n-i)
                    cout<<" ";
                else
                    cout<<"*";
        cout<<"\n";
    }
    return 0;
}
```

(20/100)

(e) Write a program that writes the multiplication table for integers from 1 to 12 into a text file called "multiplication.txt".

(20/100)

3. (a) Show the output of the following code:

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

void xFunction(int i)
{
    int num = 1;

    for (int j = 1; j <= i; j++) {
        cout << num << " ";
        num *= 3;
    }

    cout << endl;
}

int main()
{
    int i = 1;
    while (i <= 5)
    {
        xFunction(i);
        i++;
    }

    return 0;
}
```

(20/100)

- (b) Write a function to compute the following series:

$$m(i) = \frac{1}{2} + \frac{2}{3} + \dots + \frac{i}{i+1}$$

Write a test program that displays the following table:

<u>i</u>	<u>m(i)</u>
1	0.5
2	1.1667
...	
19	16.4023
20	17.3546

(20/100)

(c) Show the output of the following code:

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

void swap(int n1, int n2)
{
    int temp = n1;
    n1 = n2;
    n2 = temp;
}

int main()
{
    int a[] = {1, 2};
    swap(a[0], a[1]);
    cout << "a[0] = " << a[0] << " a[1] = " << a[1] << endl;

    return 0;
}
```

(20/100)

(d) Given the following program, fill in the values of the array in the following figure:

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

int main()
{
    int values[5];
    for (int i = 1; i < 5; i++)
    {
        values[i] = i;
    }

    values[0] = values[1] + values[4];

    return 0;
}
```

After the array is
created

0	
1	
2	
3	
4	

After the first iteration
in the loop is done

0	
1	
2	
3	
4	

After the loop is
completed

0	
1	
2	
3	
4	

After the last statement
in the main method is
executed

0	
1	
2	
3	
4	

(20/100)

- (e) (i) What is the output of the following code?

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

void f1(int x, int &y, int *z)
{
    x++;
    y++;
    (*z)++;
}

int main()
{
    int i = 1, j = 1, k = 1;
    f1(i, j, &k);

    cout << "i is " << i << endl;
    cout << "j is " << j << endl;
    cout << "k is " << k << endl;

    return 0;
}
```

(10/100)

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

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

int main()
{
    ofstream output;

    // Create a file
    output.open("scores.txt");

    // Write two lines
    output << "John" << " " << "T" << " " << "Smith"
        << " " << 90 << endl;
    output << "Eric" << " " << "K" << " " << "Jones"
        << " " << 85;

    output.close();

    ifstream input;

    // Open a file
    input.open("scores.txt");

    // Read data
    char firstName[80];
    char mi;
    char lastName[80];
    int score;
    input >> firstName >> mi >> lastName >> score;
    double sum = score;

    input >> firstName >> mi >> lastName >> score;
    sum += score;

    cout << "Total score is " << sum << endl;

    input.close();

    return 0;
}
```

(10/100)

1. (a) Tulis kenyataan aritmetik berikut dalam C++:

$$\frac{4}{3(r+34)} - 9(a+bc)^4 + \frac{3+d(2+a)}{\sqrt{a+bd}}$$

(8/100)

- (b) Tulis **empat (4)** pernyataan C++ yang berlainan tetapi bersamaan untuk menolak 1 daripada pemboleh ubah **Num**.

(8/100)

- (c) Andaikan yang **int a = 1** dan **double d = 1.0**, dan juga setiap pernyataan adalah sendiri. Apakah hasil bagi pernyataan berikut?

(i) `a = 5 + 5 * 2 % a--;` (4/100)

(ii) `a = 4 + 1 + 4 * 5 % (++a + 1);` (4/100)

(iii) `d += 1.5 * 3 + (++d);` (4/100)

(iv) `d -= 1.5 * 3 + d++;` (4/100)

- (d) Apakah kesilapan kod berikut? Tulis semula kod ini dengan betul dengan menggunakan satu pernyataan `switch` dalam C++.

```

if (score >= 60.0)
    grade = 'D';
else if (score >= 70.0)
    grade = 'C';
else if (score >= 80.0)
    grade = 'B';
else if (score >= 90.0)
    grade = 'A';
else
    grade = 'F';
    
```

(28/100)

(e) Tulis dua cara yang berlainan tetapi bersamaan untuk algoritma di bawah dengan menggunakan kata kunci C++ berikut:

(i) if-else

(20/100)

(ii) switch

(20/100)

Algoritma:

```

if value of grade is
A, add 10 to sum
B, add 7 to sum
C, add 5 to sum
D, add 3 to sum
F, print student is on probation
all other value print an error "invalid grade" message

```

2. (a) Jelaskan dengan ringkas perbezaan antara pernyataan berikut:

(i) kenyataan break dan continue.

(10/100)

(ii) ulangan while, ulangan do while dan ulangan for.

(10/100)

(b) Tulis satu atur cara yang membaca satu nilai integer untuk n dan kemudian jumlahkan nilai-nilai integer dari n sehingga $2*n$ jika n ialah bukan-negatif, atau dari $2*n$ sehingga n jika n ialah negatif.

(i) Tulis kod dengan hanya menggunakan ulangan for.

(10/100)

(ii) Tulis kod dengan hanya menggunakan ulangan while.

(10/100)

(c) Jelaskan apa yang akan berlaku apabila kod berikut dilaksanakan:

```

(i) int i=2;
    while (i<6);
    {
        cout<<"Some even numbers: "<<i<<i+2<<i+4<<endl;
        ++i;
    }

```

(10/100)

```
(ii) int i;
      do
      {
          cout<<"\nWould you like to go again? 1 = yes 0 = no";
          cin>>i;
      }while(i=1);
```

(10/100)

(d) Apakah hasil cetak atur cara berikut?

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

int main ()
{
    const int n = 5;
    for (int i=0;i<=2*n;i++)
    {
        for (int j=0;j<=2*n;j++)
            if(i<=n)
                if (j<n-i||j>n+i)
                    cout<<" ";
                else
                    cout<<"*";
            else
                if (j<i-n||j>3*n-i)
                    cout<<" ";
                else
                    cout<<"*";
        cout<<"\n";
    }
    return 0;
}
```

(20/100)

(e) Tulis satu atur cara yang akan menulis jadual darab untuk nilai integer dari 1 hingga 12 dalam fail teks yang dipanggil "multiplication.txt".

(20/100)

3. (a) Berikan hasil cetak kod berikut:

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

void xFunction(int i)
{
    int num = 1;

    for (int j = 1; j <= i; j++) {
        cout << num << " ";
        num *= 3;
    }

    cout << endl;
}

int main()
{
    int i = 1;
    while (i <= 5)
    {
        xFunction(i);
        i++;
    }

    return 0;
}
```

(20/100)

- (b) Tulis satu fungsi untuk mengira jujukan berikut:

$$m(i) = \frac{1}{2} + \frac{2}{3} + \dots + \frac{i}{i+1}$$

Tulis satu atur cara untuk menguji fungsi di atas yang memaparkan jadual di bawah:

<u>i</u>	<u>m(i)</u>
1	0.5
2	1.1667
...	
19	16.4023
20	17.3546

(20/100)

(c) Berikan hasil cetak kod berikut:

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

void swap(int n1, int n2)
{
    int temp = n1;
    n1 = n2;
    n2 = temp;
}

int main()
{
    int a[] = {1, 2};
    swap(a[0], a[1]);
    cout << "a[0] = " << a[0] << " a[1] = " << a[1] << endl;

    return 0;
}
```

(20/100)

(d) Diberi atur cara berikut, isikan kandungan tatasusunan di dalam rajah berikut:

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

int main()
{
    int values[5];
    for (int i = 1; i < 5; i++)
    {
        values[i] = i;
    }

    values[0] = values[1] + values[4];

    return 0;
}
```

Selepas
tatasusun dicipta

0	
1	
2	
3	
4	

Selepas iterasi
pertama gelung
dilaksanakan

0	
1	
2	
3	
4	

Selepas gelung
dilaksanakan
sepenuhnya

0	
1	
2	
3	
4	

Selepas pernyataan
terakhir dalam kaedah
main dilaksanakan

0	
1	
2	
3	
4	

(20/100)

(e) (i) Apakah output bagi kod berikut?

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

void f1(int x, int &y, int *z)
{
    x++;
    y++;
    (*z)++;
}

int main()
{
    int i = 1, j = 1, k = 1;
    f1(i, j, &k);

    cout << "i is " << i << endl;
    cout << "j is " << j << endl;
    cout << "k is " << k << endl;

    return 0;
}
```

(10/100)

(ii) Apakah output bagi kod berikut?

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

int main()
{
    ofstream output;

    // Create a file
    output.open("scores.txt");

    // Write two lines
    output << "John" << " " << "T" << " " << "Smith"
        << " " << 90 << endl;
    output << "Eric" << " " << "K" << " " << "Jones"
        << " " << 85;

    output.close();

    ifstream input;

    // Open a file
    input.open("scores.txt");

    // Read data
    char firstName[80];
    char mi;
    char lastName[80];
    int score;
    input >> firstName >> mi >> lastName >> score;
    double sum = score;

    input >> firstName >> mi >> lastName >> score;
    sum += score;

    cout << "Total score is " << sum << endl;

    input.close();

    return 0;
}
```

(10/100)