STUDENT NUMBER:______________________

THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

COMP 102: Computer Fundamentals and Programming

Fall Semester, 1997

MIDTERM EXAMINATION

October 23, 1997

STUDENT NAME:	______________________
STUDENT NUMBER:	______________________
DEPARTMENT:	______________________
SECTION NUMBER:	______________________
LAB. SECTION:	______________________

Instructions to Students

1. There are 12 problems and 10 pages. Check that you have all 10 pages.
2. Write your name, student no., department, section no., and lab no. on this page.
3. Write your student number on each of the following pages.
4. Answer all questions in the space provided. Rough work should be done only on the back pages and afterwards drawn a diagonal line through it to show that it is not part of your answer.
5. Leave all pages stapled together.
6. The examination period will last for **120 minutes**.
7. Stop writing immediately when the time is up.

For Grading Purpose Only

Problem 1	______________	/ 10
Problem 2	______________	/ 3
Problem 3	______________	/ 3
Problem 4	______________	/ 6
Problem 5	______________	/ 8
Problem 6	______________	/ 15
Problem 7	______________	/ 10
Problem 8	______________	/ 8
Problem 9	______________	/ 10
Problem 10	______________	/ 6
Problem 11	______________	/ 6
Problem 12	______________	/ 15
TOTAL:	______________	/ 100

1. **(10 points)** Given int a, b, c; write a logical expression, for each of the following statements, that are true when

```
i.      b is greater than both a and c.
ii.     a and b are both greater than c.
iii.    b is not less than both a and c.
iv.     a, b, and b are in non-decreasing sorted order.
v.      a is even or b is odd
vi.     b is not negative and a is at least twice as large as b and a
         is strictly smaller than 99
vii.    a is 7 or b is not 13
```

2. **(3 points)** Which of the following are valid C++ identifiers?

```
i.      MAX
ii.     Max
iii.    Ma x
iv.     max_
v.      4_u
vi.     ivu
```

3. **(3 points)** Imagine you had a computer with several gigabytes of main memory. Would you still need to have secondary memory on this computer? If so, why?

4. **(6 points)** What is the value of n after the following code is executed?

```
int n = 0;
int x = 1;
int y = 0;
int z = -1;
if(x > 0 && y+z > 0)
   n = 1;
else if(x==1 || (y <0 && z<0))
   n = 2;
else
   n = 3;
```

a) 0
b) 1
c) 2
d) 3
e) none of the above

5. **(8 points)** How many times is the function action() called?

```
int i, n;
n = 5;
action();
while(n > 0){
   i = 1;
   while(i <= 10){
      action();
      i++;
   }
   n--;
}
```

a) 1
b) 39
c) 41
d) 50
e) none of the above

6. **(15 points)** We want to write a function "print_triangle(int len)" that prints a triangle as follows:

print_triangle(3) ==>

```
  /|
 /.|
/--|
```

print_triangle(5) ==>

```
    /|
   /.|
  /..|
 /...|
/----|
```

Complete the following code:

```
void print_triangle(int len)
{
   for (int row = 1; ____________________________; row++) {
     int where = ____________________________;
     for (int col ____________________________________) {
       if ( col < where)
         cout << " ";
       else if (________________________________)
         cout << "/";
       else
         cout << ".";
      }
     cout << "|" << _______________________
   }
   cout << '/';
   for (_____________________________________; col++) {
     cout << '-';
   }
   cout << "________________________";
}
```

7. **(10 points)** What is the output of the following program?

```
#include <iostream.h>

int andy(int x, int &y)
{
  int a = x + y;
  x++;
  y -= x;
  cout << "andy: " << a << " " << x << " " << y << endl;
  return a;
}

int sandy(int &a, int b, int c)
{
  int x = 42;
  a = x - andy(b, c);
  c--;
  cout << "sandy: " << a << " " << b << " " << c << endl;
  return c;
}

int main ()
{
  int a = 2, b = 8, c = 12;
  int x = sandy(a, b, c);
  cout << "main: " << a << " " << c << " " << x << endl;
  return 0;
}
```

8. **(8 points)** Rewrite the following statement using a do-while loop:

```
int count;
cin >> count;
while (count > 0) {
cout << "Hello ";
count--;
}
cout << endl;
```

9. **(10 points)** Write a function

```
int f(int first, int second);
```

that returns the value -1 if first is less than second, 0 if they are equal, and 1 if first is greater than second.

10. **(6 points)** The following program is supposed to read in an integer n and calculate the factorial of n (1*2*3*...*n). There are two obvious bugs in the program. Fix them.

```
#include <iostream.h>
int main(){
   int n, product, k=1;
   cout << "Enter n: ";
   cin >> n;
   while(k < n){
      product = product*k;
      k++;
   }
   cout << product << endl;
   return 0;
}
```

11. **(6 points)** After the following code finishes, what will be the value of y?

```
int n = 4;
int y = 0;
int z = -1;
while(n > 0){
   y = z*(n + y);
   n--;
}
```

a) 2

b) -3

c) 0

d) 1

e) none of the above

12. **(15 points)** The following program is supposed to accept a coded input sequence and reproduce the original character sequence. For example, given an input sequence of "6a1b3c0", the output should be "aaaaaabccc". Note that the 0 signifies the end of the input sequence. The code sequence "6a1b3c" denotes that there are 6 a's followed by 1 b and 3 c's in the original character sequence.

Complete the program by filling in the blanks and writing the expand function.

```
#include <iostream.h>

________________________________________;

int main() {
        int count;
        char alphabet;

        cin >> count;
        while (count != 0) {
                cin >> alphabet;

                expand(__________________________________);
                cin >> count;
        }
        cout << endl;
        return 0;
}
```

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