The Hong Kong University of Science & Technology

COMP 102: Computer Fundamentals & Programming

Spring Semester, 1996
MIDTERM EXAMINATION
29 March, 1996 (8:30am-10:00am)

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

Instructions to Students

- Check that you have all 10 pages.
- Write your name, student number, department, and lab. section on this page.
- Write your student number on top right hand corner of each page.
- Answer all questions in the space provided.

For Use by Grader		
Question 1-5	__________________	/ 7
Question 6-9	__________________	/ 16 = 4*4
Question 10	__________________	/ 6
Question 11	__________________	/ 6
Question 12	__________________	/ 6
Question 13	__________________	/ 8
Question 14	__________________	/ 8
Question 15	__________________	/ 18
Question 16	__________________	/ 25
TOTAL:	__________________	/ 100

Question 1-5 (1 point for each correct answer) (7 points)

1. Give the long form of the following acronyms:

   CPU: ____

   RAM: ____

   OS: ____

2. Name the piece of software that translates a high-level language program to a machine-level program:

   ____

3. A byte is a group of (how many) _____________________ **bits** .

4. **4K** of memory is (how many) _______________________ **bytes** .

5. **4M** of memory is (how many) _______________________ **KBytes** .

6. **(4 points)** Which of the following variable names are *valid*? Check ONLY those correct answers with a "Y"

   ___ i. var ___ ii. end ___ iii. not ___ iv. keyword
   ___ v. for ___ vi. comp102 ___ vii. 4sale ___ viii. real

7. **(4 points)** Which of the following C++ statements contain variables whose values are destroy? Circle the best of answer a to e.

```
i) cin >> b >> c >> d;
ii) p = i + j + k;
iii) cout << "variables whose values are destroyed";
iv) cout << "a = 5";
```

a. ii) only
b. i) and ii) only
c. i) and ii) and iv) only
d. i), ii), iii) and iv)
e. none of the above

8. **(4 points)** Suppose `Flag` is an integer (**int**) variable. The statement

```
Flag = 13.5 > 12;
```

a. causes a syntax error (missing parentheses)
b. causes a syntax error (type mismatch, cannot compare float and integer)
c. assigns Flag the value `of 13`
d. assigns Flag the value `of 1`
e. none of the above

Circle the best of answer a to e.

9. **(4 points)** Which of the following 3 code segments are equivalent? Circle the best of answer a to e.

i)
```
do {
  action();
} while (A && B);
```

ii)
```
action();
while (A && B) {
   action();
}
```

iii)
```
while (A && B) {
   action();
}
```

a) i) & ii)
b) ii) & iii)
c) i) & iii)
d) i) & ii) & iii)
e) None of the above

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10. **(6 points)** Rewrite the following segment of code using a ***switch*** statement.

```
if (x == 1)
   action1();
else if (x == 2)
   action2();
else if (x == 3)
   action3();
else
   defaultaction();
```

11. **(6 points)** Show the output of the following program.

```
#include <iostream.h>
#include <iomanip.h>

void main() {
     int x,y;
     float z;

     x = 5;
     y = 2;
     z = x / y;
     cout << setw(10) << x << ","
          << setw(10) << y << endl;
     cout << setiosflags(ios::showpoint|ios::fixed);
     cout << setprecision(2);
     cout << setw(10) << z << endl;
}
```

Show your answer in the boxes below.

12. **(6 points)** Consider the following C++ program:

```
#include <iostream.h>
main() {
     float x = 0.0;
     int   z = 0;
     int   y;
     cin >> y;
     while (y >= 0) {
          z++;
          x = x + y;
          cin >> y;
     }
     cout << x/z << endl;
     return 0;
}
```

Explain in no more than three sentences what the above program does.

13. **(8 points)** The following program is supposed to read an integer n and calculates the sum of the series:

$$1^2 + 3^2 + \ldots + (2n-1)^2$$

```
#include <iostream.h>

main () {
     int n;
     int sum = 0;

     cin >> n;  // assume input > 0
     while (n > 0) {
          sum = sum + (2*n-1)*(2*n-1);
     }
     cout << sum << endl;
     return 0;
}
```

There is an obvious semantic bug in the program. Fix the program.

14. **(8 points)** Show the output of the following program:

```
#include <iostream.h>

main()
{
   for (int row = 1; row <= 5; row++) {

      for (int space = 1; space <= 5 - row; space++)
         cout << ' ';

      for (int asterisk = 1; asterisk <= 2 * row - 1; asterisk++)
         cout << '*';

      cout << endl;
   }

   return 0;
}
```

15. **(18 points)** Show the output of the following program.

```
#include <iostream.h>

int A,B,C,D;

void Two(int& A, int B, int& D) {
     B = 21; D = 23;
     cout << A << " " << B << " "
          << C << " " << D << endl;
}

void One(int& A, int B, int& C) {
     int D;    // Local variable
     A = 10; B = 11; C = 12; D = 13;
     cout << A << " " << B << " "
          << C << " " << D << endl;
     Two(A,B,C);
}

void main() {
     A = 1; B = 2; C = 3; D = 4;
     One(A,B,C);
     cout << A << " " << B << " "
          << C << " " << D << endl;
}
```


16. **(25 points)** You are to write a program to analyze a Hang Seng Index sequence. Each number in the sequence is an integer representing the closing index of the day. The sequence is terminated by a negative integer. You may assume the sequence contains at least one index value. Write a program to the find the length of the longest non-decreasing period. For example, given the following input sequence:

9377 <u>9302 9340 9402 9402 9450</u> 9337 <u>9330 9385 9450 9603 9683 9736 9747</u> -1

length of non-decreasing period: 4 6

your program should output:

6

Note: You may lose up to 10 points if your program is not easily understandable. To improve the readability, please include comments and choose meaningful variable names.