객체지향프로그래밍 - 과제4

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A. Code explanation & output analysis (Write the source code and results)

A-1. Listing 5.11

```
#include <iostream>
int main() {
  std::cout << "Help! My computer doesn't work!\n";
  char choice;
  std::cout << "Does the computer make any sounds "
    << "(fans, etc.) or show any lights? (y/n):";
  std::cin >> choice;
  // The troubleshooting control logic
  if (choice == 'n') { // The computer does not have power
    std::cout << "Is it plugged in? (y/n):";
    std::cin >> choice; if (choice == 'n') { // It is not plugged in, plug it in
      std::cout << "Plug it in. If the problem persists, "
        << "please run this program again.\n";
    }
    else { // It is plugged in
      std::cout << "Is the switch in the \"on\" position? (y/n):";
      std::cin >> choice;
      if (choice == 'n') { // The switch is off, turn it on!
        std::cout << "Turn it on. If the problem persists, "
          << "please run this program again.\n";
      }
      else { // The switch is on
        std::cout << "Does the computer have a fuse? (y/n):";
        std::cin >> choice;
        if (choice == 'n') { // No fuse
          std::cout << "Is the outlet OK? (y/n):";
          std::cin >> choice;
          if (choice == 'n') { // Fix outlet
            std::cout << "Check the outlet's circuit "
              << "breaker or fuse. Move to a "
              << "new outlet, if necessary. "
              << "If the problem persists, "
              << "please run this program again.\n";
          }
          else { // Beats me!
            std::cout << "Please consult a service "
              << "technician.\n";
          }
        }
        else { // Check fuse
          std::cout << "Check the fuse. Replace if "
            << "necessary. If the problem "
            << "persists, then "
            << "please run this program again.\n";
```

```
        }
      }
    }
  }
  else { // The computer has power
    std::cout << "Please consult a service technician.\n";
  }
}
```

💡 처음에 choice를 입력받았을 때 y인지 n인지에 따라 두개의 큰 if문으로 나뉘고 그 안에서 또 질문을 해서 세부적인 정보를 바탕으로 y/n에 따라 조언이 나옵니다.
즉, any lights에 대해 조건절이 한번 걸리고 n이라는 값을 사용자가 입력하면 plug in에 대해 질문이 또 나오고 그 안에서 fuse의 유무에 따라 조건절이 나오는 형식으로 진행됩니다.

A-2. Listing 5.12

```
// File timeconvcond1.cpp
#include <iostream>
int main() {
  // Some useful conversion constants
  const int SECONDS_PER_MINUTE = 60,
    SECONDS_PER_HOUR = 60 * SECONDS_PER_MINUTE; // 3600
  int hours, minutes, seconds;
  std::cout << "Please enter the number of seconds:";
  std::cin >> seconds;
  // First, compute the number of hours in the given number
  // of seconds
  hours = seconds / SECONDS_PER_HOUR; // 3600 seconds = 1 hours
  // Compute the remaining seconds after the hours are
  // accounted for
  seconds = seconds % SECONDS_PER_HOUR;
  // Next, compute the number of minutes in the remaining
  // number of seconds
  minutes = seconds / SECONDS_PER_MINUTE; // 60 seconds = 1 minute
  // Compute the remaining seconds after the minutes are
  // accounted for
  seconds = seconds % SECONDS_PER_MINUTE;
  // Report the results
  std::cout << hours;
  // Decide between singular and plural form of hours
  if (hours == 1)
    std::cout << " hour ";
  else
```

```
    std::cout << " hours ";
  std::cout << minutes;
  // Decide between singular and plural form of minutes
  if (minutes == 1)
    std::cout << " minute ";
  else
    std::cout << " minutes ";
  std::cout << seconds;
  // Decide between singular and plural form of seconds
  if (seconds == 1)
    std::cout << " second";
  else
    std::cout << " seconds";
  std::cout << '\n';
}
```


초단위로 입력받아서 60과 3600으로 나눈값으로 min과 hour를 나눕니다. if조건문은 hour과 minute과 second를 복수형으로 쓸것인지 구분하는 용도로만 쓰입니다.

B. Exercises (Write the questions down on your answer sheet)

(pp. 117-121), Exercises 3, 4, 8, 9, 12, 13, 15, 16, 17, 18 (write output analysis for all exercises)

3. What is the integer equivalent to true in C++?

1

4. What is the integer equivalent to false in C++?

0

8. Given the following declarations:

```
int x = 3, y = 5, z = 7;
bool b1 = true, b2 = false, b3 = x == 3, b4 = y < 3;
```

(a) x == 3

True

(b) x < y

True

(c) x >= y

False

(d) x <= y

True

(e) x != y-2

False

(f) x < 10

True

(g) x >= 0 && x < 10

True

(h) x < 0 && x < 10

False

(i) x >= 0 && x < 2

False

(j) x < 0 || x < 10

True

(k) x > 0 || x < 10

True

(l) x < 0 || x > 10

False

(m) b1

True

(n) !b1

False

(o) !b2

True

(p) b1 && b2

False

9. Express the following Boolean expression in simpler form; that is, use fewer operators. x is an int.

(a) !(x==2)

x != 2

(b) x < 2 || x == 2

x <= 2

(c) ! (x < y)

x >= y

(d) !(x <= y)

x > y

(e) x < 10 && x > 20

10 > x > 20

(f) x > 10 || x < 20

10 < x < 20

(g) x != 0

True

(h) x == 0

False

12. Write a C++ program that requests an integer value from the user. If the value is between 1 and 100 inclusive, print "OK;" otherwise, do not print anything.

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

int main() {
  int x = 0;
  cout << "Write between 1 ~ 100 : ";
  cin >> x;
  if (x > 1 && x < 100)
    cout << "OK";
}
```

13. Write a C++ program that requests an integer value from the user. If the value is between 1 and 100 inclusive, print "OK;" otherwise, print "Out of range."

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

int main() {
  int x = 0;
  cout << "Write between 1 ~ 100 : ";
  cin >> x;
  if (x > 1 && x < 100)
    cout << "OK";
  else
    cout << "Out of range";
}
```

15. Consider the following section of C++ code:

```
// i, j, and k are ints
if (i < j) {
  if (j < k)
    i = j;
  else
    j = k;
}
else {
  if (j > k)
    j = i;
  else
    i = k;
}
std::cout << "i = " << i << " j = " << j << " k = " << k << '\n';
```

what will the code print if the variables i, j and k have the following values?

(a) i is 3, j is 5, and k is 7

i = 5, j = 5, k = 7

(b) i is 3, j is 7, and k is 5

i = 3, j = 5, k = 5

16. Consider the following C++ program that prints one line of text:

```
#include <iostream>
using namespace std;
int main() {
  int input;
  cin >> input;
  if (input < 10) {
    if (input != 5)
      cout << "wow ";
    else
      input++;
  }
  else {
    if (input == 17)
      input += 10;
    else
      cout << "whoa ";
  }
  cout << input << "\n";
}
```

what will the program print if the user provides the following input?

(a) 3

wow 3

(b) 21

whoa 21

(c) 5

6

(d) 17

27

(e) -5

wow -5

17. Why does the following section of code always print "ByeHi"?

```
int x;
std::cin >> x;
if (x < 0);
std::cout << "Bye";
std::cout << "Hi\n";
```

Bye와 Hi가 모두 if문 안에 들어있지 않기때문에 항상 ByeHi로 출력이 됩니다.

18. Write a C++ program that requests five integer values from the user. It then prints the maximum and minimum values entered. If the user enters the values 3, 2, 5, 0, and 1, the program would indicate that 5 is the maximum and 0 is the minimum. Your program should handle ties properly; for example, if the user enters 2, 4, 2, 3, and 3, the program should report 2 as the minimum and 4 as maximum.

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

int main() {
  int a, b, c, d, e, max,min;
  cout << "<< 최대값 최소값 출력>>"<<endl;
  cout << "첫 번째 값 : ";
  cin >> a;
  cout << "두 번째 값 : ";
  cin >> b;
  cout << "세 번째 값 : ";
  cin >> c;
  cout << "네 번째 값 : ";
  cin >> d;
  cout << "다섯 번째 값 : ";
  cin >> e;
  if (a < b) {
    max = b;
    if (b < c) {
      max = c;
      if (c < d) {
        max = d;
        if (d < e)
          max = e;
        else
          max = d;
      }
      else {
        if (c < e)
          max = e;
      }
    }
    else {
      if (b < d) {
        max = d;
      }
      else
        max = e;
    }
  }
  else {
    max = a;
    if (a < c) {
```

```
      max = c;
      if (c < e)
        max = e;
    }
    else {
      if (a < e)
        max = e;
    }
  }
  cout << "최대값 : " << max<<endl;
  if (a > b) {
    min = b;
    if (b > c) {
      min = c;
      if (c > d) {
        min = d;
        if (d > e)
          min = e;
      }
      else if (d > e)
        min = e;
    }
    else if (b > d) {
      min = d;
      if (d > e)
        min = e;
    }
  }
  else {
    min = a;
    if (a > c) {
      min = c;
      if (a > e)
        min = e;
    }
    else if (a > e)
      min = e;
  }
  cout << "최솟값 : " << min;
}
```

C. Additional exercises (Write the questions down on your answer sheet)

C-1. If the variable flag is true, read the integer variables a and b, Then calculate and print the sum and average of both inputs.

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

int main() {
  int a, b;
  cout << "첫번째 숫자 : ";
```

```
  cin >> a;
  cout << "두번째 숫자 : ";
  cin >> b;
  int avg, sum;
  sum = a + b, avg = sum / 2;
  cout << "sum : " << sum << endl;
  cout << "avg : " << avg << endl;
}
```

C-2. Write a program that determines and prints a student's grade. The program will read three types of scores (quiz, mid-term, and final scores) and determine the grade based on the following rules:

1) If the average score = 90%, then grade=A

2) If the average score >= 70% and <90%, then grade=B

3) If the average score>=50% and <70%, then grade=C

4) If the average score<50%, then grade=F

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

int main() {
  int eng = 0, kor = 0, mat = 0;
  cout << "Write your Eng score : ";
  cin >> eng;
  cout << "Korean score : ";
  cin >> kor;
  cout << "Math score : ";
  cin >> mat;
  int avg = (eng + kor + mat) / 3;
  if (avg >= 90 && avg <= 100)
    cout << "average score is "<< avg << ' A';
  else if (avg >= 70 && avg < 90)
    cout << "average score is " << avg << ' B';
  else if (avg >= 50 && avg < 70)
    cout << "average score is " << avg << ' C';
  else if (avg < 50 && avg >= 0)
    cout << "average score is " << avg << ' F';
  else
    cout << "Wrong score";
}
```

C-3. Write a program that defines and prints whether an entered integer is odd or even.

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

int main() {
  int x;
  cout << "Write number : ";
  cin >> x;
  if (x % 2 == 0)
    cout << x << " is even";
  else
    cout << x << " is odd";
}
```