Some simple programs

Objectives

- Review first practical
- Start writing basic programs involving
  - Simple input
  - Variables – their declaration and management
  - Simple computations
  - Simple output
  - Maybe a simple for loop variation
- Complete Chapter 2 of the textbook.
Recap:

//Sums the numbers from 1 to an entered number
#include <iostream>
using namespace std;

int main() {
    int i, n, sum;
    cout << "Enter a number\n";
    cin >> n;
    sum = 0;
    for (i=1; i<=n; i++)
        { sum = sum + i; }
    cout << "The sum of numbers to " << n;
    cout << " is " << sum << "\n";
    return 0;
}

The computation

sum = 0;  Initialise sum
for (i=1;  For each value of i, from 1
    i<=n;  up to and including n
    i++)  adding 1 to i each time
dois this:
    { sum = sum + i;  Add the current i to sum}
Name that variable:

A. a
B. aveScore
C. AverageScore
D. AVERAGE

Which is not appropriate?

A. bool done = false;
B. int n = 6.2;
C. double num_years = 0;
D. char ans= ‘Y’;
Which of these assumes x has been initialised?

A. `cin << x;`
B. `y = x;`
C. `x = y;`
D. `x++;`

Integer Division & Remainder

- The operands for integer division and remainder are `/` and `%` respectively
  - `10 / 3` is 3
  - `10 % 3` is 1
- It’s only if both operands are integers that the division is integer division.
  - `10.0 / 3.0` or `10.0 / 3` or `10 / 3.0` all give `3.333333333`
Drop the decimal

- By assigning a decimal number to an integer variable, you effectively drop the decimal part. For example:

```c
int i;
double x = 3.1415;
i = x; // puts the integer part of the value of x into the variable i;
//drops the decimal part
cout << i; // prints the value 3.
```

Compute change

- amount is number of cents change to issue
  - int amount = 786;
- coin2E is the value of a 2 euro coin
  - int coin2E = 200;
- How many of them?
  - int num2E = ??
- What's left?
  - amount = ??
- See the program on the web page.
Which is NOT true at the end?

```c
int x, y, z;
double w, t;
x = 23; y = 35;
x = x + y / 4 - 3;
z = x % 3;
w = 28 / 3 + 6.5 * 2;
t = x / 4.0 + 15 % 4 - 3.5;
```

A. x is 28
B. y is 35
C. z is 1
D. w is 22.333
E. t is 6.5

*Which is NOT true at the end?

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D. w is 22.333
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Quadratic roots

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

- Assuming that \(a\) is not 0, and that \(b^2 > 4ac\)
  write a program to read in \(a\), \(b\), \(c\) and to print both roots.
- Use intermediate variables to simplify
  - e.g. discriminant for \((b^2 - 4ac)\)
  - To compute the square root of \(x\) use “\(\text{sqrt}(x)\)“.

3 Simple Programs

```cpp
1    cout << "Area is: " << area << endl;
2    const double PI = 3.14;
3    cin >> radius;
4    double area = PI * radius * radius;
5    cout << "Enter radius: ";
6    double radius;
```

Which ordering will work?

A.  2 6 4 5 3 1
B.  6 5 3 4 2 1
C.  6 5 2 4 3 1
D.  5 6 3 2 4 1
*Which ordering will work? Why?*

A. 2 6 4 5 3 1  
B. 6 5 3 4 2 1  
C. 6 5 2 4 3 1  
D. 5 6 3 2 4 1

---

**Other problems we might try**

- **Simple problems:**
  - Read in an amount in pounds and output its equivalent in euros (£1 = 1.27).
  - Read in two numbers, write out their sum, difference and product.

- **Using a FOR loop:**
  - Compute n! (i.e. the factorial of n).
  - Print out the integers from 1 to n.
  - Print n down to 1. ("i--" subtracts 1 from i).
  - Print the even numbers 2 to 50. ("i = i+2" adds 2 to i).
Now

- We can’t cover every detail in class.
- Read Chapter 2 of the textbook.
- You need to cover, by yourself
  - Arithmetic operators and operator precedence
  - Type conversion
  - Details of input and output