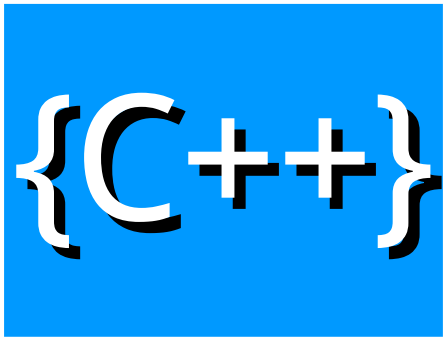
# Control Statements

Week 2

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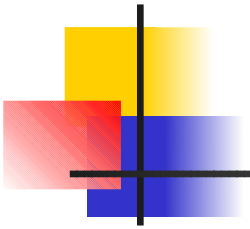
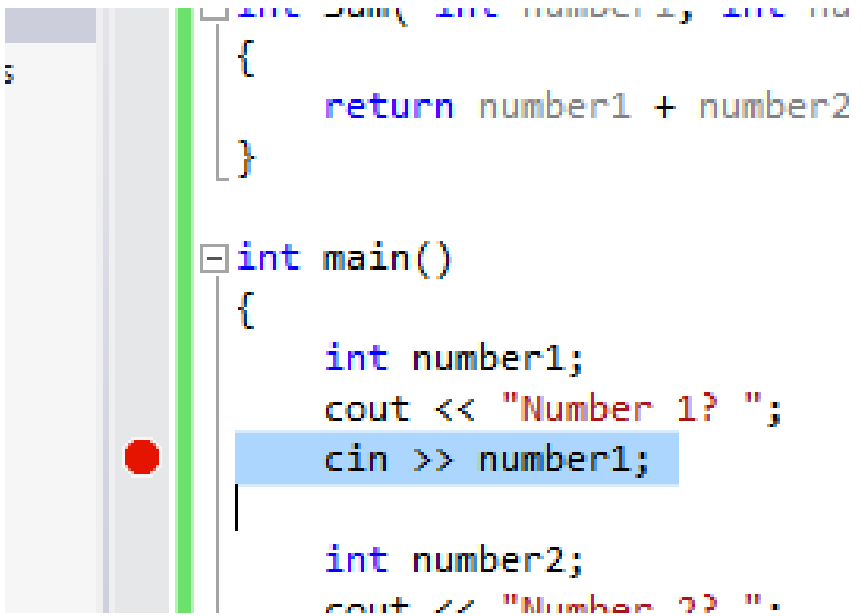


# Debugging with Breakpoints

- At some point, you might have a non-obvious bug in your program you need to debug.
- Visual Studio (and other IDEs) have debugging tools available to make it easier.

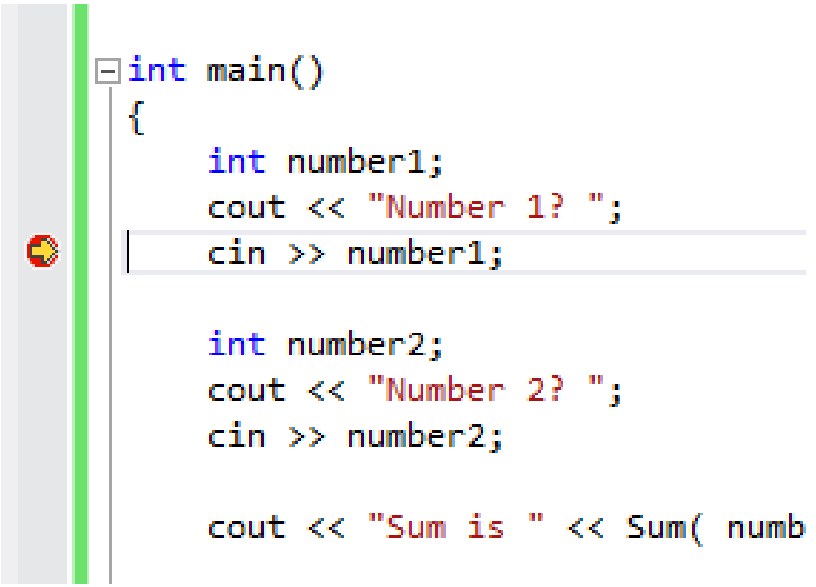
# Debugging with Breakpoints

- You can activate a breakpoint by double-clicking in the margin next to your code.



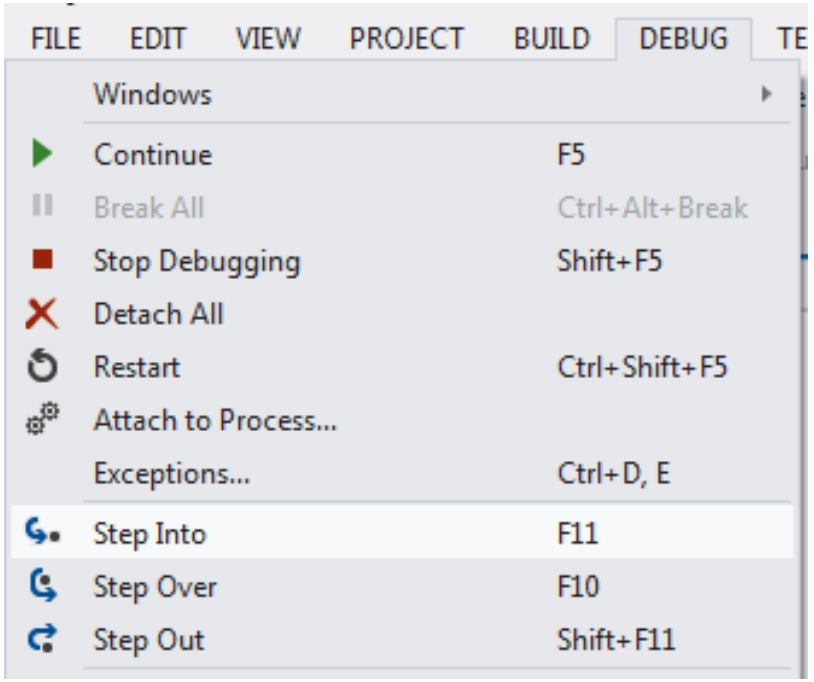
# Debugging with Breakpoints

- When you run your program, it will start up as normal, but once it hits a breakpoint it will pause the program execution and bring you to the IDE.



# Debugging with Breakpoints

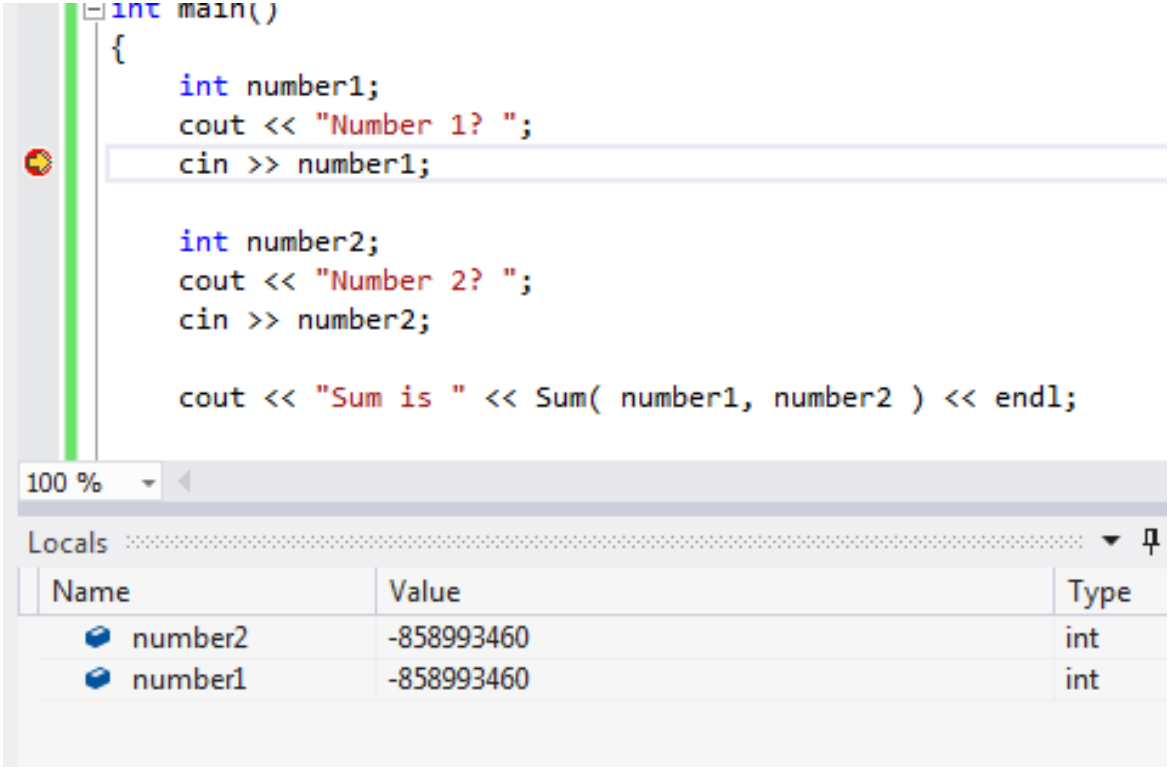
- You can continue stepping through the program execution line-by-line using the DEBUG menu.




- Step Into will take you into a function if called, or a block of code.
- Step Over will go over the line of code to the next line.
- Step Out will take you outside of a function or block.

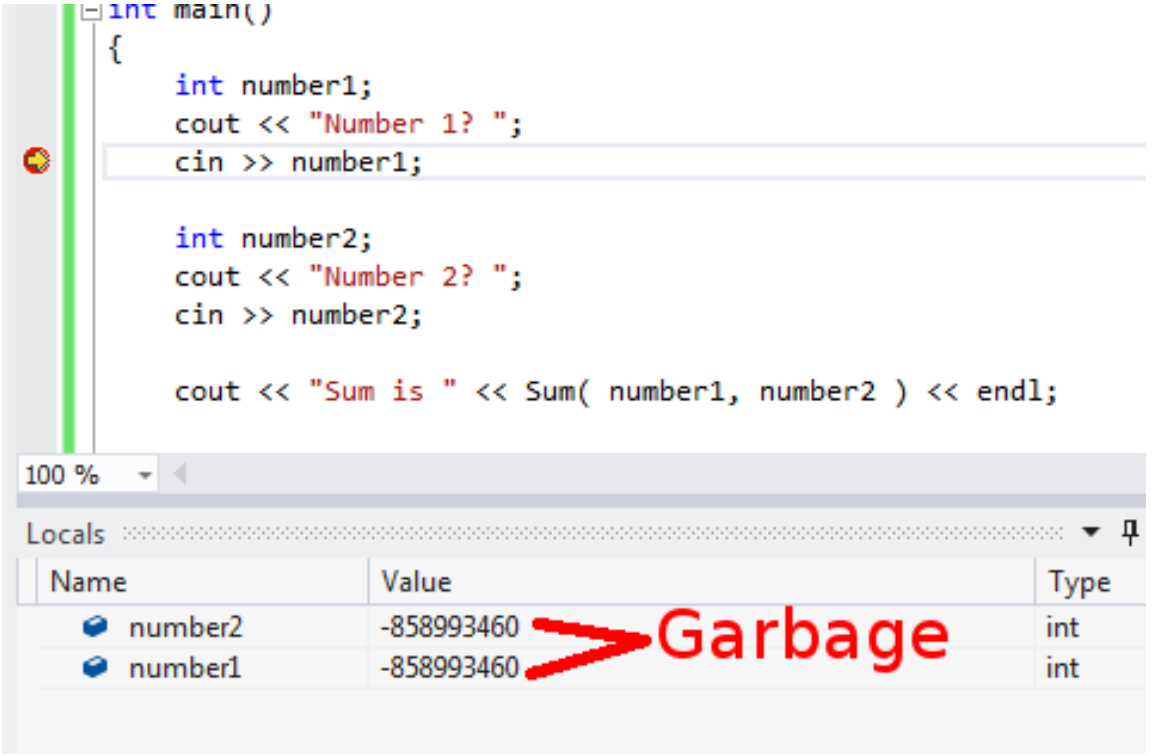
# Debugging with Breakpoints

- The Locals window will show you variables that are ***local to the current function***.



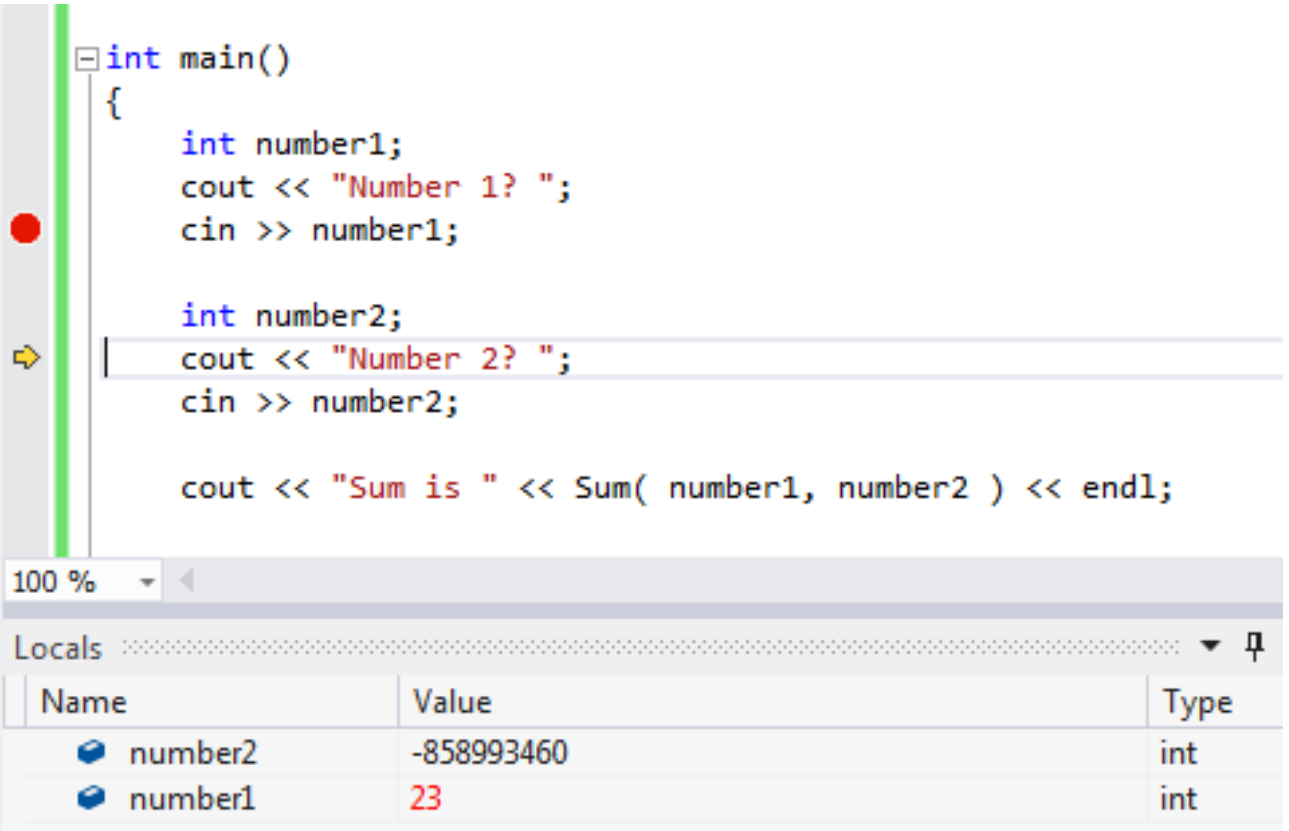
# Debugging with Breakpoints

- At this point in the program, number1 has been declared but the cin >> number1; command has not executed.
- Both variables have “garbage” for their values.



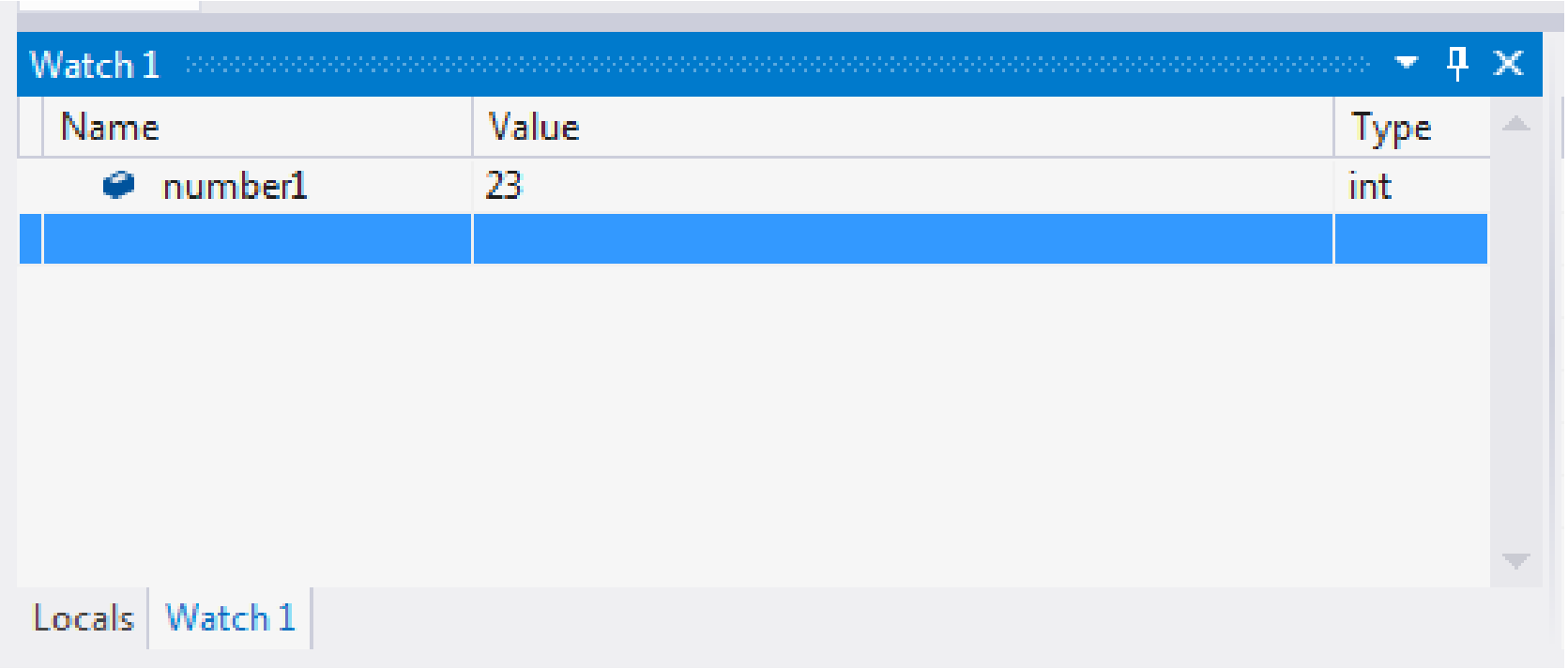
# Debugging with Breakpoints

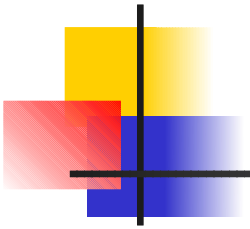
- If we use “Step Over” (then go back to the program and enter a number), the Locals window will be updated with the new value.



# Debugging with Breakpoints

- In the same pane as the Locals window is the Watch tab. Here, you can type in a variable's name and keep track of its value as the program runs.





# Debugging with cout

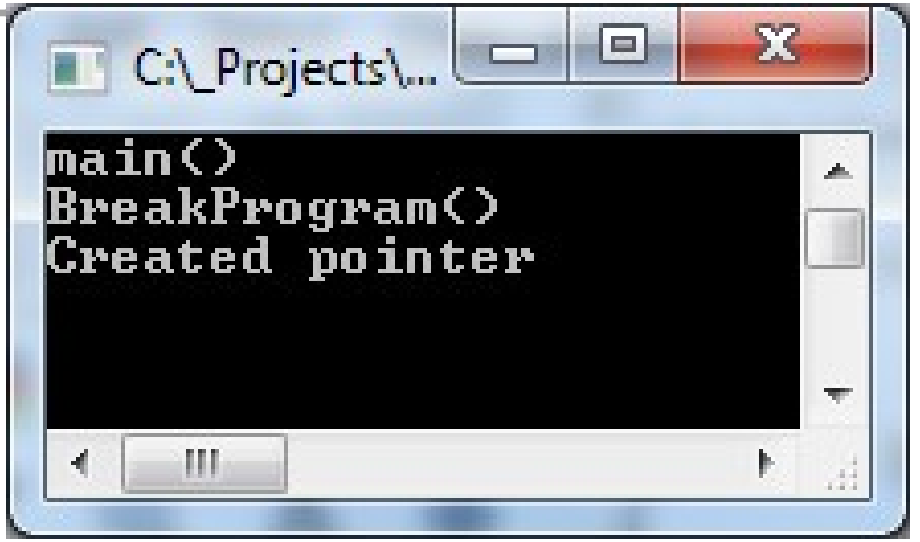
- If you want to be lazy, you can try to pinpoint where your program broke just by outputting information to the console at certain points to follow the program flow.

# Debugging with cout

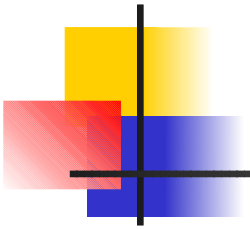
main.cpp

(Global Scope)

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

void BreakProgram()
{
    cout << "BreakProgram()" << endl;
    int* ptrStuff;
    cout << "Created pointer" << endl;
    cout << ptrStuff << endl;
    cout << "Output pointer" << endl;
}

int main()
{
    cout << "main()" << endl;
    BreakProgram();

    return 0;
}
```



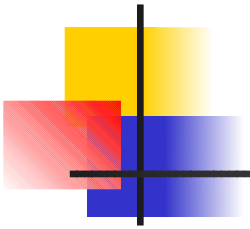

We can tell that the “Output pointer” text was never printed to the screen, so the crash happened between “Created pointer” and “Output pointer”.



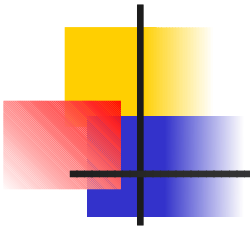
# Example 1

- Download the C++ program( exercise_1.cpp ) from Courseware Server of Virtual Classroom
- Identify and correct the errors
- Tip: You can find 5 errors.

# Example 2



- Download the C++ program( exercise_2.cpp ) from Courseware Server of Virtual Classroom
- Find why the result is "1 is right"
  - Tip1: In C/C++, 0.7
    - As float is stored as 0.69999998807907104492187 5
    - As double is stored as 0.69999999999999955591079014994
  - Tip 2: Use setprecision(20) to show the exact value of variables



# Assignment 2

- Body Mass Index Calculator
- TDEE Calculator
- TIPS
  - Use **cout** to show a question or results
  - Use **cin** to read a input data
  - Use **if-else** statement ,**comparison operators** and **logical operators** to make a decision
  - Use **arithmetic operators** to calculate BMI and TDEE

- TIPS
  - Arithmetic operators: =, +, -, *, /
  - Comparison operators: ==, !=, >, <, >=, <=
  - Logical operators: and(&&), or(||), not(!)

# BMI

$$BMI = \frac{mass(kg)}{height(m)^2}$$

| Category | BMI range(kg/m$^2$) |
|---|---|
| Underweight | under 18.5 |
| Normal | from 18.5 to 24 |
| Overweight | from 24 to 27 |
| Moderately obese | from 27 to 30 |
| Severely obese | from 30 to 35 |
| Very severely obese | over 35 |

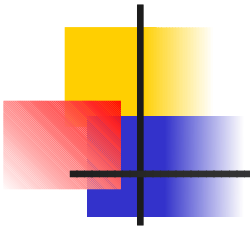
# BMR(Basel Metabolic Rate)

- m: weight(kg)
- h:height(cm)
- a: age(year)
- s: gender, s=5(male), s=-161(female)
- BMR=10*m+6.25*h-5*a+s

$$P = \left( \frac{10.0m}{1\ \text{kg}} + \frac{6.25h}{1\ \text{cm}} - \frac{5.0a}{1\ \text{year}} + s \right) \frac{\text{kcal}}{\text{day}}$$

# TDEE(Total Daily Energy Expenditure)

| Category | TDEE |
|---|---|
| Sedentary(office job) | BMR*1.2 |
| Light Exercise(1-2 days/week) | BMR*1.375 |
| Moderate Exercise(3-5 days/week) | BMR*1.55 |
| Heavy Exercise(6-7 days/week) | BMR*1.725 |
| Athlete(2x per day) | BMR*1.9 |



# TIPS

- In C/C++
  5 is an integer number
  5.0f is a float number
  5.0 is a double number.

# Input Format

- Input Format

Input Gender(Male:1/Female:2): 1
Input Age(year): 40
Input mass(kg): 73
Input height(cm): 168
Activity List
1. Sedentary(office job)
2. Light Exercise(1-2 days/week)
3. Moderate Exercise(3-5 days/week)
4. Heavy Exercise(6-7 days/week)
5. Athlete(2x per day)
Input Activity: 1

# Output Format

- Output Format

Gender: Male
Age(year): 40
Mass(kg): 73
Height(cm): 168
BMI:25.864
You are Overweight
BMR: 1585
You are Sedentary
TDEE: 1902