Outline

- Examples of if/else
- Declare a variable
- Questions on string, arithmetic, type casting
- Programming Exercise
Distinguish the following

- `=` Assign a value to a variable
  ```
  int a = 5;
  ```

- `==` Test of equality
  ```
  int b = 4;
  if(b == 4) {
      cout << “The value of b is 4”;
  }
  ```

- Other relational operators:
  ```
  >, >=, <, <=, !=
  ```
int main() {
    int a = 5;
    cout << "this is before if" << endl;
    if(a > 3) {
        cout << "this is if" << endl;
    }
    cout << "this is after if" << endl;
    return 0;
}

[dzhang@venus CS111]$ ./a.out
this is before if
this is if
this is if
this is after if
[dzhang@venus CS111]$
int main() {
    int a = 5;
    cout << "this is before if" << endl;
    if(a > 8) {
        cout << "this is if" << endl;
    } 
    cout << "this is after if" << endl;
    return 0;
}

[dzhang@venus CS111]$ ./a.out
this is before if
this is after if
[dzhang@venus CS111]$
int main() {
    int a = 5;
    cout << "this is before if/else" << endl;
    if(a > 3) {
        cout << "this is if" << endl;
    } else {
        cout << "this is else" << endl;
    }
    cout << "this is after if/else" << endl;
    return 0;
}

[dzhang@venus CS111]$ ./a.out
this is before if/else
this is if
this is after if/else
[dzhang@venus CS111]$
int main() {
    int a = 5;
    cout("this is before if/else") << endl;
    if(a > 8) {
        cout("this is if") << endl;
    } else {
        cout("this is else") << endl;
    }
    cout("this is after if/else") << endl;
    return 0;
}

[dzhang@venus CS111]$ ./a.out
this is before if/else
this is else
this is after if/else
[dzhang@venus CS111]$
Declare a variable

- In order to use a variable in C++, we must first declare it.

- Syntax:
  ```
  variable_type variable_name;
  ```

- Example:
  ```
  int a;
  double b;
  string c;
  ```
A variable should be declared only once

- The following is wrong

```c
int main() {
    int a;
    int a = 1;
    return 0;
}
```
A variable has only one type

- The following is wrong

```java
int main() {
    int a = 1;
    string a = "hello";
    return 0;
}
```
The following is correct

```cpp
int main() {
    int a = 5;
    if(a > 3) {
        int b = 3;
        cout << b;
    }
    int b = 7;
    cout << b;
    return 0;
}
```
However, this is wrong

```c
int main() {
    int a = 5;
    if(a > 3) {
        int b = 3;
        cout << b;
    }
    b = 7;
    cout << b;
    return 0;
}
```
The following is correct

```c++
int main() {
    int a = 5;
    if(a > 3) {
        string b = "hello";
        cout << b;
    } else {
        string b = "hi";
        cout << b;
    }
    return 0;
}
```
However, this is wrong

```cpp
int main() {
    int a = 5;
    if(a > 3) {
        string b = "hello";
        cout << b;
    } else {
        b = "hi";
        cout << b;
    }
    return 0;
}
```
Q1: What is the output?

```cpp
int main() {
    string a = "hello";
    string b = "hello";
    cout << a << b;
    return 0;
}
```

A. hellohello                      B. hello
   hello
Q2: What is the output?

```cpp
int main() {
    string a = "a";
    string b = "a";
    cout << a << b;
    return 0;
}
```

A. ab  B. aa
Q3: What is the output?

```cpp
int main() {
    string a = "b";
    string b = "a";
    cout << a << b;
    return 0;
}
```

A. ab     B. ba
Q4: What is the output?

```cpp
int main() {
    string a = "b";
    string b = "a";
    cout << a << b << "a" << "b";
    return 0;
}
```

A. baab          B. abab
Q5: What is the output?

```c
int main() {
    int a = 4;
    int b = 3;
    cout << a / b;
    return 0;
}
```

A. 1  
B. 1.33
Q6: What is the output?

```c
int main() {
    int a = 5;
    int b = 3;
    cout << a / b;
    return 0;
}
```

A. 1  B. 2
Q7: What is the output?

```cpp
int main() {
    int a = 5;
    double b = 2.0;
    cout << a / b;
    return 0;
}
```

A. 2  B. 2.5
Q8: What is the output?

```c++
int main() {
    int a = 2;
    double b = a;
    cout << b;
    return 0;
}
```

A. 2  B. error
Q9: What is the output?

```c
int main() {
    double a = 2.718;
    int b = (int)a;
    cout << b;
    return 0;
}
```

A. 2         B. 3
Exercise

Jane is deciding how much time she will spend on CS111 in the following way. Currently she spends 3 hours per week.

- She took 2 tests in CS111. For each test, her score was some integer between 0 and 10 (including 0 and 10).
- She will calculate her average score of the 2 tests. If her average score is more than or equal to 9.5 points, she will not change her study plan. Otherwise, for each 0.5 point below 9.5, she will study 1 more hour per week per week.
- For example, if her average score is 8.5, she will study for 3+2=5 hours per week in future.
Create a C++ program. The program should ask Jane to input the 2 scores she got, and then output how many hours per week she should study in future.

- Try to simulate the given situation. E.g., the program should compare her average score with 9.5, not compare her total score with 19.
Answers

- Q1 A
- Q2 B
- Q3 B
- Q4 A
- Q5 A
- Q6 A
- Q7 B
- Q8 A
- Q9 A