

Review of the Lectures

Switch statement

- Syntax:

```
switch (expression)
{
    case constant1:
        group of statements 1;
        break;
    case constant2:
        group of statements 2;
        break;
    .
    .
    .
    default:
        default group of statements
}
```

- The expression after cases should be constants [important]
- Conversion between switch statement and if-else statement:

<pre>if (x == 1) { cout << "x is 1"; } else if (x == 2) { cout << "x is 2"; } else { cout << "value of x is unknown"; }</pre>	<pre>switch (x) { case 1: cout << "x is 1"; break; case 2: cout << "x is 2"; break; default: cout << "value of x unknown"; }</pre>
---	--

While loop

- Syntax:

```
while (condition1)
    body2;
```

Execution order: 1 2 1 2 1 2

- Interpretation: `body` is repeatedly run while the `condition` holds

do-while loop

- Syntax:

```

do
{
    Body2;
}while (condition1) ;
2 1 2 1 ... ..

```

- Interpretation: do-while loop works similarly as while loop, but run `body` once no matter what, and then test the condition

For loop

- Syntax:

```

initialization
for (; condition ; )
{
    body;
    update
}

```
- Interpretation: `initialization` initializes the counter to keep track of the number of times the loop is executed; `condition` checks the counter or the condition; `update` state changes the counter.

- Evaluation rule:

```

for ( initialization1 ; condition2 ; update4 )
    body3

```

1. Execute `initialization`.
2. Evaluate the `condition`.

If true,

3. Run the `body`.
4. Do the `update`.

Go back to 2.

If false,

Exit the for loop.

For-loop and while-loop conversion

<pre> for (initialization; condition; update) { body } </pre>	<pre> Initialization while (condition) { body update } </pre>
---	---

Infinite Loops: the loop proceeds endlessly, either due to the loop having no terminating condition or the terminating condition can never be met

```
for ( ; ; )  
{  
    ;  
}
```

```
x = 1; y = 0;  
while (y == 0) {  
    x = x + 1;  
}
```

```
int x;  
x = 1;  
while(x > 0) ;  
    x = x - 1;
```

Exercises

Example #0: Can we convert Program 1 to Program 2?

```
////////// Program 1 //////////
#include <iostream>
using namespace std;

int main()
{
    int grade = 85;
    if (grade >= 90)
        cout << "A" << endl;
    else if (grade >= 80)
        cout << "B" << endl;
    else
        cout << "C or D or F" << endl;
    return 0;
}
```

```
////////// Program 2 //////////
#include <iostream>
using namespace std;

void main()
{
    int grade = 85;
    switch(true)
    {
        case grade >= 90:
            cout << "A" << endl;
            break;
        case grade >= 80:
            cout << "B" << endl;
            break;
        default:
            cout << "C or D or F" << endl;
    }
}
```

Example #1: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int i;
```

```
    for(i = 0; i <= 0; i++)
        cout << "Hello Loop!" << endl;
    cout << "i = " << i << endl;
    return 0;
}
```

Example #2: What is the output of the program below?

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

int main()
{
    int i;

    for(i = 0; i < 0; i++)
        cout << "Hello Loop! " << endl;

    cout << "i = " << i << endl;

    return 0;
}
```

Example #3: What is the output of the program below?

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

int main()
{
    int i;

    for(i = 0; i < 1; i++)
        cout << "Hello Loop!" << endl;

    cout << "i = " << i << endl;

    return 0;
}
```

Example #4: What is the output of the program below?

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

int main()
{
    int a=2,b=1;
```

```
    for(int i=0; i<4; i++)
        b = b*a;

    cout << b << endl;
    return 0;
}
```

Example #5: What is the output of the program below?

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

int main()
{
    int a=2,b=1;

    for(int i=0;i<=4;i++)
        b = b*a;

    cout << b << endl;
    return 0;
}
```

Example #6: Does the following program have compilation error? If No, what is the output?

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

int main()
{
    int a=2,b=1;

    for(int i=0;i<=4;i++) ;
        b = b*a;

    cout << b << endl;
    return 0;
}
```

Example #7: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int x;

    for(x=0; x<=5; x++)
        if ( (x*x - 8*x + 15) == 0 )
            cout << "x = " << x << endl;

    return 0;
}
```

Example #8: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int x=0,count=0; // Initialization

    while(count != 1)
    {
        if ( (x*x - 8*x + 15) == 0 )
        {
            cout << "x = " << x << endl;
            count++;
        }
        x++;
    }
    return 0;
}
```

Example #9: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int i;

    for(i=0;i<3;i++)
        cout << i << endl;
        cout << i << endl;

    return 0;
}
```

Example #10: Convert the for-loop in Example #9 by using while looooooooooop...

```
#include <iostream>
using namespace std;
int main()
{
    int i;

    i =    0        ; // fill in the blank

    while(    i < 3        ) // fill in the blank
    {
        cout << i << endl;
        i++;
    }
    cout << i << endl;

    return 0;
}
```

Example #11: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    for(int i=0, double j = 100 ; i < 10 ; i++ , j++ )
        ;

    cout << "i = " << i << " , j = " << j << endl;

    return 0;
}
```

Example #12: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    for(int i=0,j=100 ; i < 10 ; i++ , j++ )
        ;

    cout << "i = " << i << " , j = " << j << endl;

    return 0;
}
```

Example #13: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    double j=100;

    for(int i=0; i < 10 ; i++ , j++ )
        ;

    cout << "i = " << i << " , j = " << j << endl;

    return 0;
}
```

Example #14: What is the output of the program below?

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

int main()
{
    int i=0;
    double j=100;

    for( ; i < 10 ; i++ , j++ )
        ;

    cout << "i = " << i << " , j = " << j << endl;

    return 0;
}
```

Example #15: What is the output of the program below?

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

int main()
{
    int i;
    double j;

    for( i = 0 , j = 100 ; (i < 10) && (j < 110) ; i++ , j++ )
        ;

    cout << "i = " << i << " , j = " << j << endl;

    return 0;
}
```

Example #16: What is the output of the program below?

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

int main()
{
    int i , j;

    for( i = 0 ; i < 2 ; i++ )
        for( j = 0 ; j < 2 ; j++ )
            cout << i * j;

    cout << endl;

    return 0;
}
```

Example #17: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int n = 0, a = 2, b = 1;
    while(n!=4)
    {
        b = b*a;
        n++;
    }
    cout << a << "^" << n << " = " << b << endl;
    return 0;
}
```

```
}
```

Example #18: What is the output of the program below?

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

```
int main()
{
    int n=4,a=2,b=1;

    while(n != 0)
    {
        b = b*a;
        n--;
    }

    // Is the output the same as Example #27 ?
    cout << b << endl;

    return 0;
}
```

Example #19: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int n=4,a=2,b=1;

    while(n!=4)
    {
        b = b*a;
        n++;
    }

    cout << b << endl;

    return 0;
}
```

Example #20: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int a = 1;
    do
    {
        a = 2;
    }while (1!=0)

    cout << "a = " << a << endl;

    return 0;
}
```

Example #21: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int a = 1;
    do
    {
        a = 2;
    }while (1!=0) ;

    cout << "a = " << a << endl;

    return 0;
}
```

Example #22: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int x = 2, y = 3, z = 0, n = 0;

    while ( n != y )
    {
        n = n + 1; // 2
        z = z + x; // 4
    }

    if ( z == (x * y) )
```

```
        cout << "z = x times y." << endl;
    else
        cout << "Trap!!" << endl;

    return 0;
}
```

Example #23: What is the output of the program below?

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

int main()
{
    int i;

    for(i = 1 ; i < 10 ; i = i + 2 )
        cout << i << endl;

    return 0;
}
```

Example #24: What is the output of the program below?

```
#include <iostream>
using namespace std;
int main()
{
    int a = 1;

    do
    {
        a = 2;
    }while (1!=1);

    cout << "a = " << a << endl;

    return 0;
}
```

Example #25: All things considered....

```
#include <iostream>
using namespace std;
int main()
{
    int i=0;

    while(i < 1)
    {
        i++;
        cout << "T";

        do
        {
            cout << "h";
        } while(1!=1);

        if ( 1 <= 2 && 2<= 3 )
            cout << "i";
        if ( 1 >= 2 && 2 >= 3 )
            cout << "n";
        else
            cout << "s";

        for (; i<=1; i++)
            if( i < 2147483647 ) cout << " is ";
            else cout << "k ";
    }

    if( i == 1) cout << "again!";
    else cout << "the last Example.";

    if ( i > -9999 )
        cout << " Thank you for your patience!" << endl;

    return 0;
}
```