3.3 More if-else

Nested if-else statements

A branch's statements can include any valid statements, including another if-else statement, which are known as ***nested if-else*** statements.

Figure 3.3.1: Nested if-else.

```
if (userChoice == 1) { // userChoice is 1
   ...
}
else if (userChoice == 2) {
   if (numItems < 0) { // userChoice is 2 and numItems < 0
      ...
   }
   else {              // userChoice is 2 and numItems >= 0
      ...
   }
}
else {                 // userChoice is not 1 or 2
   ...
}
```

Feedback?

PARTICIPATION ACTIVITY | 3.3.1: Nested if-else statements. ✓

Determine the final value of salesBonus given the initial values specified below.

```
if (salesType == 2) {
   if (salesBonus < 5) {
     salesBonus = 10;
   }
   else {
      salesBonus = salesBonus + 2;
   }
}
else {
   salesBonus = salesBonus + 1;
}
```

1) salesType = 1;
salesBonus = 0;

○ 0

Correct ✓

salesType is 1, so the first if's expression is false. The else branch executes and increases salesBonus by 1,

● 1

○ 10

yielding 0 + 1, or 1.

2) salesType = 2;
salesBonus = 4;

○ 5

○ 6

● 10

✓

Correct

The first if's expression is true, so nest if-else statement executes. The nested if's expression is true, so salesBonus is assigned with 10.

3) salesType = 2;
salesBonus = 7;

○ 8

● 9

○ 10

✓

Correct

The first if's expression is true and the nested if's expression is false. So, the nested else branch executes, assigning salesBonus with 7 + 2, or 9.

Feedback?

Multiple distinct if statements

Sometimes the programmer has multiple if statements in sequence, which looks similar to a multi-branch if-else statement but has a very different meaning. Each if-statement is independent, and thus more than one branch can execute, in contrast to the multi-branch if-else arrangement.

Figure 3.3.2: Multiple distinct if statements.

```
Enter age: 12
Enjoy your early years.

...

Enter age: 27
You are old enough to drive.
You are old enough to vote.
Most car rental companies will
rent to you.

...

Enter age: 99
You are old enough to drive.
You are old enough to vote.
Most car rental companies will
rent to you.
You can run for president.
```

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

int main() {
   int userAge;

   cout << "Enter age: ";
   cin  >> userAge;

   // Note that more than one "if" statement can
execute
   if (userAge < 16) {
      cout << "Enjoy your early years." << endl;
   }

   if (userAge > 15) {
      cout << "You are old enough to drive." << endl;
   }

   if (userAge > 17) {
      cout << "You are old enough to vote." << endl;
   }

   if (userAge > 24) {
      cout << "Most car rental companies will rent to
you." << endl;
   }

   if (userAge > 34) {
      cout << "You can run for president." << endl;
   }

   return 0;
}
```

Feedback?

PARTICIPATION ACTIVITY | 3.3.2: If statements. ✓

Determine the final value of numBoxes.

1)

```
numBoxes   = 0;
numApples  = 9;

if (numApples < 10) {
   numBoxes = 2;
}
if (numApples < 20) {
   numBoxes = numBoxes + 1;
}
```

3

Check Show answer

✓ **Correct**

3

The first if statement executes, assigning 2 to numBoxes. The second if statement also executes, assigning 2 + 1 or 3 to numBoxes.

2)

✓ **Correct**

```
numBoxes  = 0;
numApples = 9;

if (numApples < 10) {
   if (numApples < 5) {
      numBoxes = 1;
   }
   else {
      numBoxes = 2;
   }
}
else if (numApples < 20) {
   numBoxes = numBoxes + 1;
}
```

2

Check

Show answer

2

The first branch executes, which is a nested if-else. The second nested branch executes, assigning 2 to numBoxes. The numApples < 20 branch is skipped because it is part of the if-else for which the if branch was taken.

Feedback?

CHALLENGE ACTIVITY 3.3.1: Enter the output for the multiple if-else branches. ✓

Jump to level 1

Type the program's output.

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

int main() {
   int numItems;

   numItems = 5;

   if (numItems < 2) {
      cout << "c" << endl;
   }

   if (numItems < 9) {
      cout << "f" << endl;
   }

   if (numItems == 5) {
      cout << "k" << endl;
   }

   cout << "r" << endl;

   return 0;
}
```

```
f
k
r
```

1 2 3

Check Next **Done**. Click any level to practice more. Completion is preserv

✓ Each if-statement is independent. If numItems < 2 is true, "c" is outputted. If numItems < 9 i == 5 is true, "k" is outputted. "r" is outputted in any case.

Yours

```
f
k
r
```

Expected

```
f
k
r
```

Feedback?

CHALLENGE ACTIVITY 3.3.2: If-else statements.

Jump to level 1

☑ 1
☑ 2

Print "userNum1 is negative." if userNum1 is less than 0. End with newline.
Assign userNum2 with 5 if userNum2 is greater than 9. Otherwise, print "userNum2 is less or equal 9.". End with newline.

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

int main() {
   int userNum1;
   int userNum2;

   cin >> userNum1;
   cin >> userNum2;

   /* Your code goes here */
   if (userNum1 < 0){
      cout << "userNum1 is negative." << endl;
   }
   if ( userNum2 > 9){
      userNum2   = 5;
   }else{
      cout<<"userNum2 is less or equal 9."<<endl;
   }

   cout << "userNum2 is " << userNum2 << endl;

   return 0;
}
```

1 **2**

Check

Try again

Done. Click any level to practice more. Completion is preserved.

✓ A possible solution uses an if statement for userNum1, and an if-else statement for userNum2.

✓ 1: Compare output

Input
```
0 10
```

Your output
```
userNum2 is 5
```

✓ 2: Compare output

Input
```
-1 9
```

Your output
```
userNum1 is negative.
userNum2 is less or equal 9.
userNum2 is 9
```

✓ 3: Compare output

Input
```
1 -2
```

Your output
```
userNum2 is less or equal 9.
userNum2 is -2
```

Feedback?