3.16 Conditional expressions

If-else statements with the form shown below are so common that the language supports the shorthand notation shown.

PARTICIPATION ACTIVITY 3.16.1: Conditional expression.

2x speed

```
if (condition) {
  myVar = expr1;
}
else {
  myVar = expr2;
}
```

```
myVar = (condition) ? expr1 : expr2
```

An if-else statement can be written as a conditional expression.

Feedback?

A ***conditional expression*** has the form `condition ? exprWhenTrue : exprWhenFalse`.

All three operands are expressions. If the `condition` evaluates to true, then `exprWhenTrue` is evaluated. If the condition evaluates to false, then `exprWhenFalse` is evaluated. The conditional expression evaluates to whichever of those two expressions was evaluated. For example, if x is 2, then the conditional expression `(x == 2) ? 5 : 9 * x` evaluates to 5.

A conditional expression has three operands and thus the "?" and ":" together are sometimes referred to as a ***ternary operator***.

Good practice is to restrict usage of conditional expressions to an assignment statement, as in: y = (x == 2) ? 5 : 9 * x;. Common practice is to put parentheses around the first expression of the conditional expression, to enhance readability.

PARTICIPATION ACTIVITY 3.16.2: Conditional expressions.

Convert each if-else statement to a single assignment statement using a conditional expression, using parentheses around the condition. Enter "Not possible" if appropriate. ..

1)

```
if (x > 50) {
   y = 50;
}
else {
   y = x;
}
```

```
y = (
x > 50
) ?
50 : x;
```

Check Show answer

Correct

x > 50

In the code provided `(x > 50)` is the condition evaluated to determine what value is assigned to y.

2)

```
if (x < 20) {
   y = x;
}
else {
   y = 20;
}
```

```
y = (x < 20)
? x : 20;
```

Check Show answer

Correct

? x : 20;

`x` is evaluated and assigned to y when (x < 20) is true. `20` is evaluated and assigned to y when (x < 20) is false.

3)

```
if (x < 100) {
   y = 0;
}
else {
   y = x;
}
```

```
y = (x < 100) ? 0 : x;
```

Check Show answer

Correct

y = (x < 100) ? 0 : x;

`0` is evaluated and assigned to y when (x < 100) is true. `x` is evaluated and assigned to y when (x < 100) is false.

4)

```
if (x < 0) {
   x = -x;
}
else {
   x = x;
}
```

```
x = (x < 0) ? -x : x;
```

Check Show answer

Correct

x = (x < 0) ? -x : x;

`-x` is evaluated and assigned to x when (x < 0) is true. `x` is evaluated and assigned to x when (x < 0) is false.

5)

```
if (x < 0) {
   y = -x;
}
else {
   z = x;
}
```

```
Not possible
```

Correct

Not possible

The if branch assigns y, while the else branch assigns z, so this cannot be converted to a

Check Show answer conditional expression.

Feedback?

CHALLENGE ACTIVITY 3.16.1: Conditional expression: Print negative or positive.

Create a conditional expression that evaluates to string "negative" if userVal is less than 0, and "non-negative" otherwise. Ex: If userVal is -9, output is:

```
-9 is negative.
```

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

int main() {
   string condStr;
   int userVal;

   cin >> userVal;

   condStr = (userVal < 0)?"negative":"non-negative";

   cout << userVal << " is " << condStr << "." << endl;

   return 0;
}
```

Run ✓ All tests passed

✓ Testing: -9

Your output `-9 is negative.`

✓ Testing: 0

Your output `0 is non-negative.`

✓ Testing: 44

Your output `44 is non-negative.`

Feedback?

CHALLENGE ACTIVITY 3.16.2: Conditional assignment.

Using a conditional expression, write a statement that increments numUsers if updateDirection is 1, otherwise decrements numUsers. Ex: if numUsers is 8 and updateDirection is 1, numUsers becomes 9; if updateDirection is 0, numUsers becomes 7.

Hint: Start with "numUsers = ...".

```
1  #include <iostream>
2  using namespace std;
3
4  int main() {
5     int numUsers;
6     int updateDirection;
7
8     cin >> numUsers;
9     cin >> updateDirection;
10
11    /* Your solution goes here  */
12    numUsers = (updateDirection ==1)? ++numUsers:--numUsers;
13
14    cout << "New value is: " << numUsers << endl;
15
16    return 0;
17 }
```

Run ✓ All tests passed

✓ Testing with numUsers initially 8, updateDirection = 1

Your output `New value is: 9`

✓ Testing with numUsers initially 75, updateDirection = 0

Your output `New value is: 74`

Feedback?