

COMP 141

if, if-else, relational operators



Announcements

- Reminders:
 - Program #1 due on 9/5 by 11:55pm
 - Tutors will start on Tuesday, Sept. 3rd
 - Sun-Thurs 7-10pm in Briggs 019
 - Keep up with the zyBooks assignments
 - Posted on course website and in zyBooks

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Practice (#1 on in-class lab from Wednesday)

Write a program, saved as a file called `taxes.py`, that asks the user for

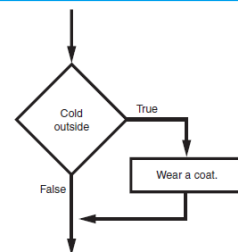
- their hourly wage (a float)
- how many hours they work per day (a float)
- how many days they work per week (an int)

Your program should print their gross pay (how much they make before taxes are deducted), as well as their net pay (how much they make after taxes are deducted; assume 15% is taken out for taxes).

Use appropriate strings in your print statements so that the user knows which number is which.

The `if` Statement

Figure 4-1 A simple decision structure



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The `if` Statement

- **Python syntax:**

```
if condition:
    Statement
    Statement
```

- **First line known as the `if` clause**

- Includes the keyword `if` followed by condition
 - The condition can be true or false
 - When the `if` statement executes, the condition is tested, and if it is true the block statements are executed. Otherwise, block statements are skipped

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`if` Statement Examples

```
if a < b:
    print("a is less than b")

if a > b:
    print("a is greater than than b")

if a <= b:
    print("a is less than or equal to b")

if a >= b:
    print("a is greater than or equal to b")
```

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Boolean Expressions and Relational Operators

- **Boolean expression:** expression tested by `if` statement to determine if it is true or false
 - Example: `a > b`
 - `true` if `a` is greater than `b`; `false` otherwise
- **Relational operator:** determines whether a specific relationship exists between two values
 - Example: greater than (`>`)

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Boolean Expressions and Relational Operators

Table 4-2 Boolean expressions using relational operators

Expression	Meaning
<code>x > y</code>	Is <code>x</code> greater than <code>y</code> ?
<code>x < y</code>	Is <code>x</code> less than <code>y</code> ?
<code>x >= y</code>	Is <code>x</code> greater than or equal to <code>y</code> ?
<code>x <= y</code>	Is <code>x</code> less than or equal to <code>y</code> ?
<code>x == y</code>	Is <code>x</code> equal to <code>y</code> ?
<code>x != y</code>	Is <code>x</code> not equal to <code>y</code> ?

`==` operator determines whether the two operands are equal to one another

Do not confuse with assignment operator (`=`)

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Boolean Expressions and Relational Operators

Any relational operator can be used in a decision block

- Example: `if balance == 0:`
- Example: `if payment != balance:`

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Code with an if-Statement

```
# This program calculates your exam average.

exam1 = int(input("What is your first exam score? "))
exam2 = int(input("What is your second exam score? "))
exam3 = int(input("What is your third exam score? "))
average = (exam1 + exam2 + exam3) / 3

choice = input("Did you do the extra assignment? (yes or no)")
if choice == "yes":
    average = average + 5

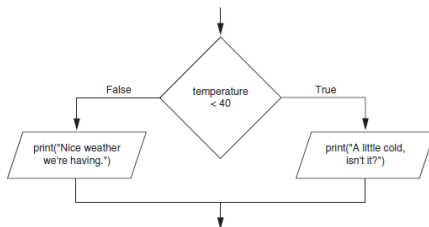
print("Your exam average is", average)
```

Saved as exam-if.py in my code directory

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The if-else Statement

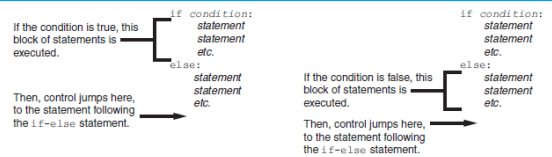
Figure 4-6 A dual alternative decision structure



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The if-else Statement

Figure 4-7 Conditional execution in an if-else statement



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if-else Example

```
# This program calculates your exam average.

exam1 = int(input("What is your first exam score? "))
exam2 = int(input("What is your second exam score? "))
exam3 = int(input("What is your third exam score? "))
average = (exam1 + exam2 + exam3) / 3

choice = input("Did you do the extra assignment? ")
if choice == "yes":
    print("Your exam average is", average + 5)
else:
    print("Your exam average is", average)
```

Saved as exam-if-else.py in my code directory

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Comparing Strings

- Strings can be compared using the == and != operators
- String comparisons are **case sensitive**
- Strings can be compared using >, <, >=, and <=
 - Compared character by character based on the ASCII values for each character
 - If shorter word is substring of longer word, longer word is greater than shorter word

	M	a	r	y
	77	97	114	121
	↓	↓	↓	↓
	77	97	114	107
	M	a	r	k

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Using String Comparisons

```
#This program takes in 2 names and prints them out
#in alphabetical order

name1 = input("Enter name 1: ")
name2 = input("Enter name 2: ")

print("Here are the names, listed alphabetically.")

if name1 < name2:
    print(name1)
    print(name2)
else:
    print(name2)
    print(name1)
```

Saved as compareNames.py in my code directory

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Trace this Code

```
x = 1
y = 2
z = 3
if x < y:
    x = x + 1
    z = x - 1
if y < z:
    y = y - 1
if x < y:
    x = x + 1
else:
    z = z + x + 1
print(x, y, z)
```

Practice

1. Write a program that prompts a user for his or her age and prints out whether or not they are (legally) allowed to drink alcohol.
2. Write a program that asks the user if they want to calculate the area of a square or a triangle. (The user will type in square or triangle.)
 - If they enter square, then ask the user for the length of a side and print the area.
 - If they enter triangle, then ask the user for the base and height and print the area.

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