

Day 2

If – Elif – Else – Conditionals – Logicals – Incrementing – Nesting

Objectives

Students should be able to:

- Use if, else, and else-if statements and follow their logic.
- Understand and use nested if statements.
- Use conditional and logical operators.

Comparison Operators

Comparison Operators

- We have already seen a few comparison operators.
- These are used to compare numbers and sometimes other forms of data.
- They can be used in the conditions of if and elif statements.
- They are:
 - Less than <
 - Greater than >
 - Less than or equal to <=
 - Greater than or equal to >=
 - Equal to ==
 - Not equal to !=
- Notice that the equal to comparison uses two equal signs not one.

If statements

If statements

- Very often in programming, we only want some code to run if something else occurs.
- For example, if a customer is of a certain age, we can give them a discount.
- Or if the user presses a button on our app, they will be sent to another screen.
- This is usually done using an if statement.
- In an if statement, we specify what condition we want to check for, and the code we want to run if that condition occurs.

If Statements – Example

Source File

```
print('Enter your age')
age = int(input())
if age < 13:
    print('You get a discount')
    print('Your price is $200')
print('Thank you')
```

Explanation

- We first ask the user to enter their age. We then use an if statement to check if the age is less than 13.
- Then we print out messages telling the user that they received a discount and that their price is \$200.
- Notice that these two lines of code are indented under the condition. That means they are “inside” of the if statement and will only run if the condition is met.

If Statements – Example Continued

Source File

```
print('Enter your age')
age = int(input())
if age < 13:
    print('You get a discount')
    print('Your price is $200')
print('Thank you')
```

Explanation continued

- The lines of code inside an if statement will only run if the condition is true, in this case, if the age entered is less than 13.
- If the condition is not true, then the lines of code inside the if statement are ignored.
- The last line of code thanks the user. This line of code is not indented under the condition and therefore is not inside of the if statement. This means it will run whether the condition is true or false.

If Statements – Example Outputs

Output 1

```
Enter your age
9|
You get a discount
Your price is $200
Thank you
>>>
```

Output 2

```
Enter your age
14
Thank you
>>> |
```

Explanation of output

- For output 1, the user entered an age of 9, which is less than 13, so the condition was true. Therefore, the user got a discount.
- For output 2, the user entered an age of 14 which is not less than 13, so the condition was false. Therefore, the user did not get a discount.
- The thank you message is printed for both users.

Else Statements

Else Statements

- An if statement runs some code if a condition is true and ignores the code if that condition is false.
- Sometimes we want one set of code which runs when the condition is true, and one which runs when the condition is false.
- This is done using an if-else statement.
- An if-else statement has an if clause and an else clause. If the condition is true, the code inside the if clause is run, while the else clause is ignored. If the condition is false, the if clause gets ignored, and the else clause is run.

If-Else Statements – Example

Source File

```
print('Enter your age')
age = int(input())
if age < 13:
    print('You get a discount')
    print('Your price is $200')
else:
    print('You do not get a discount')
    print('Your price is $500')
print('Thank you')
```

Explanation

- If the user's age is less than 13, the code inside the if clause runs and the code inside the else clause is ignored.
- If the user's age is not less than 13, the code inside the else clause runs and the code inside the if clause is ignored.
- Because of this, either the code inside the if clause runs or the code inside the else clause runs.

Else-If Statements – Example Outputs

Output 1

```
Enter your age
9
You get a discount
Your price is $200
Thank you
>>>
```

Output 2

```
Enter your age
14
You do not get a discount
Your price is $500
Thank you
>>> |
```

Explanation of output

- For output 1, the user entered an age of 9, which is less than 13, so the code inside the if clause ran.
- For output 2, the user entered an age of 14 which is not less than 13, so the code inside the else clause ran instead.
- Like a normal if-statement, any code after the if-else statement which is not indented runs regardless of the condition. Therefore the “thank you” message was displayed for both situations.

Elif Statements

If-Elif Statements

- Sometimes we want the following logic: if a condition occurs, we run some code. If not, we check some other condition to decide if to run a different set of code.
- For example, we want to check if someone is below the age of 13 to give them a children's discount. If not, then we want to check if they're over 50 to give them a senior's discount.
- To accomplish this, we use an if-elif statement.
- An if-elif statement has an if clause and an elif clause, both of which have conditions. If the first condition is true, the code inside the if clause runs. If the first condition is false, but the second condition is true, the code inside the elif clause runs. If neither are true, both are ignored.

If-Elif Statements – Example

Source File

```
print('Enter your age')
age = int(input())
if age < 13:
    print('You get a discount')
    print('Your price is $200')
elif age > 50:
    print('You get a discount')
    print('Your price is $300')
```

Explanation

- The if statement checks if the age is less than 13 and gives them a price of \$200 if it is.
- If not, the elif statement checks if their age is greater than 50 and gives them a price of \$300 if it is.
- If neither of the conditions are true, then both sets of code are ignored.

If-Else Statements – Example Outputs

Output 1

```
Enter your age  
9  
You get a discount  
Your price is $200  
>>>
```

Output 2

```
Enter your age  
55  
You get a discount  
Your price is $300  
>>> |
```

Output 3

```
Enter your age  
20  
>>>
```

If-Elif-Else Statements

- If-elif statements can have as many elif clauses as needed.
- The conditions are checked one at a time and the first one which is true runs. All the others are ignored.
- If-elif statements can also have an else clause which only gets run if none of the conditions are true.

If-Elif-Else Statements – Example

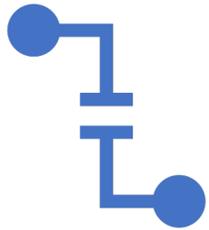
```
print('Enter your age')
age = int(input())
print('Enter your birth month')
month = int(input())
if month == 7:
    print('You get a discount')
    print('Your price is $100')
elif age < 12:
    print('You get a discount')
    print('Your price is $200')
elif age > 50:
    print('You get a discount')
    print('Your price is $300')
elif age < 20:
    print('You get a discount')
    print('Your price is $400')
else:
    print('You do not get a discount')
    print('Your price is $500')
```

Explanation

- The if statement checks if the user's birth month is 7 (July) and gives them a discount if they are.
- The elif clauses each check for a different age range and gives an appropriate discount.
- Remember that only one of the clauses will run even though more than one condition is true. The first true condition will run.
- If none of the conditions are true, then the else clause runs and does not give a discount.

Logical Operators

Logical Operators



Logical operators are used to put multiple conditions in an if statement or can be used to modify a condition.



They are:

or – checks to see if either one of two conditions are met.

and – checks to see if both conditions are met.

not – checks to see if a condition is not met.

Logical Operators – Example

```
print('Enter your age')
age = int(input())
print('Enter your birth month')
month = int(input())
if month == 7 or age < 12:
    print('You get a discount')
    print('Your price is $100')
elif age < 20 and month == 8:
    print('You get a discount')
    print('Your price is $200')
else:
    print('You do not get a discount')
    print('Your price is $500')
```

Explanation

- The if statement checks if the user's birth month is 7 OR if they are under 12 years old. It gives them a \$100 price if either or both are true. If both are false, then this clause is skipped and the next clause is checked.
- The elif clause checks if the user is under 20 AND their birth month is 8. It gives them a price of \$200 if both are true. If either one is false, then the elif clause is skipped and the else clause runs.

Counters and Increments

Counters and Increments

- You can use the following code to increase a variable by 1.
- $x = x + 1$
- This code takes the current value of x , adds 1 to it, and sets the answer as the new value of x . So, if x was 5, now it will be 6.
- This is very useful when counting how many times something happened.
- This can be used for any variable and replacing the 1 with another number will cause the variable to increase by that number.

Nested if statements

Nested if statements

- You can put any code inside of an if statement or elif or else clause.
- This includes other if-elif-else statements.
- This is called nesting if-statements
- The nested statements only run if the clause it is inside of ran.

Nested if statements

```
print('Enter your age')
age = int(input())
print('Enter you birth month')
month = int(input())
discount = 0
if age <= 12:
    discount = discount + 200
    if month == 7:
        discount = discount + 100
```

Explanation

- The outer if-statement checks to see if the user's age is at most 12, and if it is, the discount is increased by 200 and then the nested if-statement is checked.
- This nested if-statement checks to see if the user's birth month is July, and if it is then the discount is increase by a further 100; it will now be 300. If their birth month is not July, then the discount remains at 200.
- If the users age is greater than 12, then everything inside the first if statement, including the nested if statement is ignored. So even if the user was born in July, if they are not 12 or under, they do not get any of the discounts.