# GCSE

Practical programming skills in Python

#### Regular expressions

Topic 4





#### **Objectives**

- Review the purpose of validation, one of the programming techniques that may be helpful to complete the controlled assessment tasks
- Understand the purpose of a regular expression
- Be able to use a regular expression to validate an input

## Validation

- Validation is the process of checking data as it is input to make sure it meets certain rules
- You've probably already done some validation with simple numbers:
  - e.g. pupil age must be less than 16
  - e.g. pupil height cannot be more than 2m



## Validating patterns

- A Regular Expression is a tool you can use to check that an input from a user matches a particular pattern
  - e.g. a credit card number must be 16 digits long
  - e.g. a phone number must start with a 0
  - e.g. a postcode must go LLNN NLL (where L is a letter, N is a number)
- Can you think of some other input data that always follows a certain pattern?



#### A simple regular expression

• Try the following code:

```
import re
name = input("Enter your name: ")
valid = re.match("[A-Z]",name)
if valid:
    print("That looks OK")
else:
    print("Invalid, no capital")
```

## A simple regular expression

- The program on the previous slide will check to see if the name the user entered starts with an uppercase letter ([A-Z])
- If the user typed a name that started with a lowercase letter then the user would see the message:

```
"Invalid, no capital"
```



#### **Regular expression syntax**

- This line loads the regular expression library: import re
- This line checks to see if the first characters of the name matches the pattern ([A-Z])

valid = re.match("[A-Z]",name)



#### **Uppercase and lowercase**

- You can check that whatever the user types in should start with a lowercase letter ([a-z] or an uppercase letter [A-Z])
- You can also check for digits using [0-9]





#### Worksheet 4

Complete Questions 1 and 2





#### Postcodes

- Postcodes have to fit a certain pattern
  - UK postcodes are between 6 and 8 characters long
  - All UK postcodes include letters and numbers
  - The first 2 letters indicate the geographical area of the postcode:
    - W1 8BL is in West London
    - CB7 8LY is in Cambridge
    - NE15 6BN is in Newcastle
- What other rules does a postcode follow?



#### **Postcode formats**

• All postcodes are in one of the following formats:

Format	Example
LN NLL	M1 1AA
LNN NLL	M60 1NW
LLN NLL	CR2 6XH
LLNN NLL	DN55 1PT
LNL NLL	W1A 1HQ
LLNL NLL	EC1A 1BB

• We will build up our validation rule step by step



#### Matching codes

• Try this code:

```
import re
code = input("Enter your postcode: ")
valid = re.match("[A-Z][A-Z][0-9]",code)
if valid:
    print("That looks OK")
else:
    print("Erm, try again! ")
```



## Matching codes

 This program will check that the data entered by the user goes Letter-Letter-Number

i.e. [A-Z][A-Z][0-9]

 It is important **not** to add any spaces as the regular expression will try to match the pattern exactly



#### **Regular expression codes**

- We can add more detail to our rule by simply adding more characters.
- [A-Z] A capital letter
- [a-z] A lower case letter
- [0-9] A digit
- m A specific letter (in this case, 'm')
- [a-zA-Z] Any letter (upper or lower case)



## Allowing multiple characters

- Adding a '+' symbol lets you allow multiple instances of that character
- [A-Z]+ means at least 1 upper case letter:
   e.g. "A", "ASDF" or "QWERTYUIOP"
- [A-Z]+[0-9] means at least one letter and then a number:

```
e.g. "U2" or "SHED7"
```

 [A-Z]+[0-9]+ means at least one letter and at least one number:

```
e.g. "U2", "SHED7", "UB40", "LEVEL42" or "HAIRCUT100"
```



## **Allowing multiple characters**

- Try this code:
  - import re

```
code= input("Enter your postcode: ")
```

```
valid = re.match("[A-Z]+[0-9]",code)
```

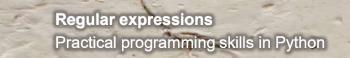
```
if valid:
```

print("That looks OK")

```
else:
```

```
print("Erm, try again! ")
```





#### Worksheet 4

Complete Question 3







## Plenary

• Which of these postcodes would be allowed with the following rule?

#### [A-Z]+[0-9]+ [0-9][A-Z]+

Accepted?





## Plenary

• Which of these postcodes would be allowed with the following rule?

#### [A-Z]+[0-9]+ [0-9][A-Z]+

Postcode	Accepted?
TSB16 1DA	Yes
Cb23 9GF	No: Lower case letter
W18BL	No: No space
NH54 1QNM	Yes
T16 S1DA	No: A letter after space



#### Worksheet 4

- Have a look at the extension activity Question 4
  - Write the program to fully test a postcode for validity



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