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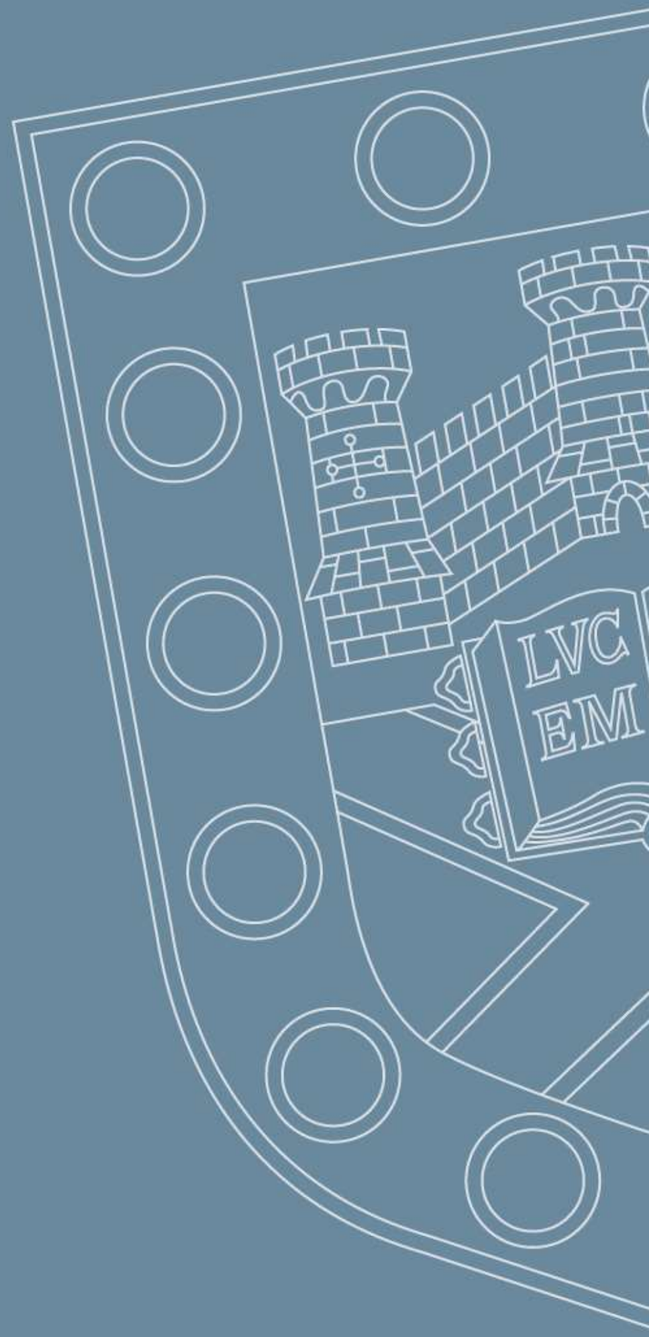
Python programming

Logic



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IF AND ELSE

Conditional branching

```
value = input()
if value == 'BYE':
    print('Goodbye!')
    exit()
```

IF AND ELSE

else

```
value = input('Your name, or bye')
if value == 'BYE':
    print('Goodbye!')
    exit()
else:
    print('Hello', value)
```

IF AND ELSE

else if else

```
if value == 'BYE':
    print('Goodbye!')
else:
    if value == 'QUIT':
        print('Goodbye!')
        exit()
    else:
    print('Hello', value)
```

IF AND ELSE

if elif else

```
if value == 'BYE':
    print('Goodbye!')
    exit()
elif value == 'QUIT':
    print('Goodbye!')
    exit()
else:
    print('Hello', value)
```

LOGIC

in

```
if value in ['BYE','QUIT']:
    print('Goodbye!')
    exit()
else:
    print('Hello', value)
```

The `in` keyword tests if the value of the variable is found in the list.

LOGIC

Conditional expressions

```
A is B
A in [B]
A not in [B]
not A
A and B
A or B
A is B
```

```
A == B
A != B
A > B
A < B
A <= B
A >= B
```

LOGIC

Boolean algebra

```
# Values True False
# Operators or and not


# Boolean arithmetic, e.g.
not (a and b)
# is equivalent to
 (not a) or (not b)
```

LOGIC

Truth tables

a	b	a and b	not (a and b)
0	0	0	1
0	1	0	1
1	0	0	1
1	1	1	0

LOGIC

Untrue!

```
if False or 0 or None or "" or [] or {}:
    # Nothing to do
else:
    print("They're all untrue!")
```

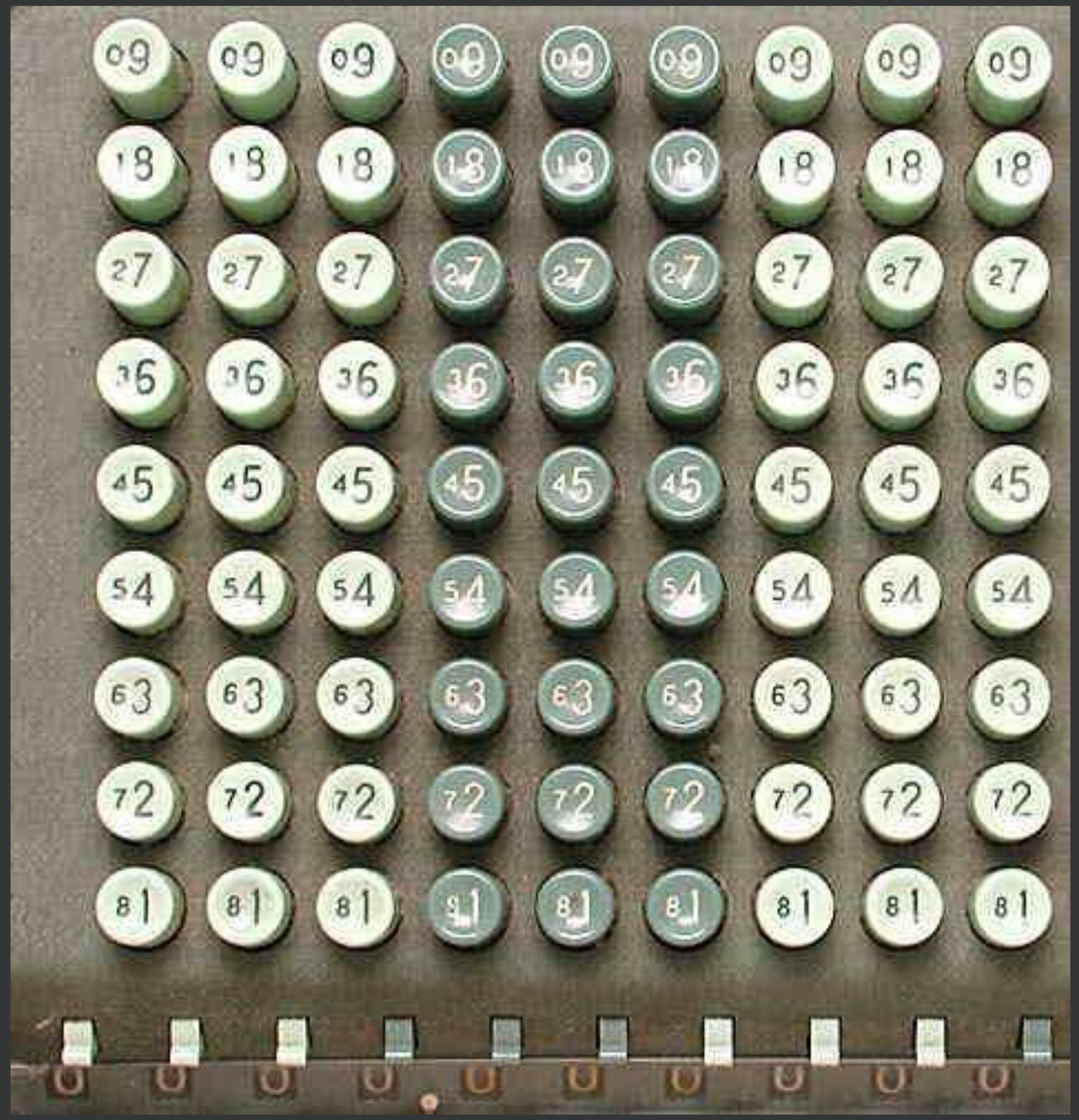
BINARY ARITHMETIC

Add or subtract two numbers in binary

number	8	4	2	1
5	0	1	0	1
+ 4	0	1	0	0
=	1	0	0	1

number	8	4	2	1
5	0	1	0	1
+ ~4	1	0	1	1
= (1)	0	0	0	0
+1	0	0	0	1
=	0	0	0	1

MECHANICAL “COMPUTERS”



Comptometers, used for accounting had keyboards that showed the compliment of each number.

To subtract 2, add 7.

Then an extra 1 in the rightmost column.

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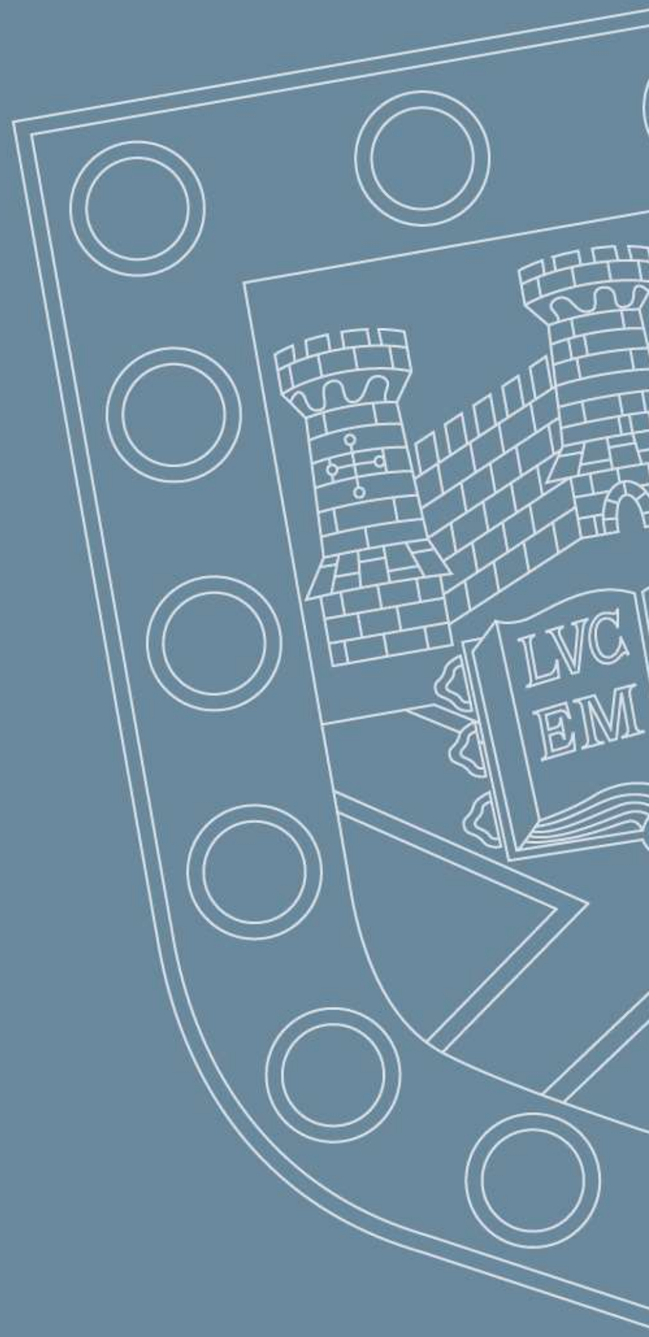

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