

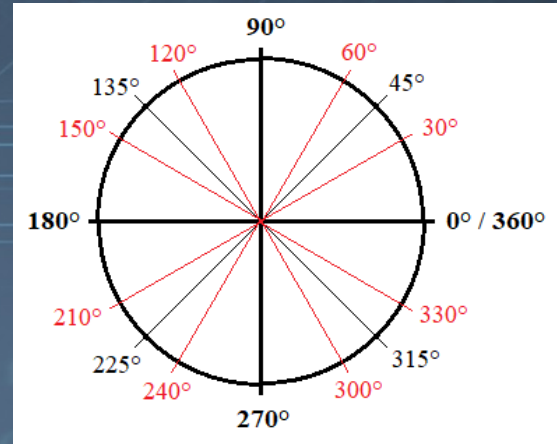
ROBOTICS FROM SCRATCH

Data Types Review

- Which data types are the following variables?
- `age = 25`
 - Integer
- `new_number = "twelve"`
 - String
- `pi = 3.14159`
 - Float
- `is_running = True`
 - Boolean

Comparators

- Comparing 2 values or variables
- Why do we need to use these?
- Hypothetical: We are tracking the current angle that the robot is facing. We want it to turn to face 90 degrees.
- If the current angle is larger than 90, then we need to turn clockwise.
- If the current angle is smaller than 90, then we need to turn counter-clockwise.



Comparators

>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
==	Equal to
!=	Not equal to (! is not)

Comparators Examples

- Is this true: $5 > 2$?
- Type it in the shell / output window
- How about: $5 < 2$
- $'a' == 'a'$
 - True
- $'Bob' == 'bob'$
 - False

Logical Operators

- Sometimes (often) you will need to compare multiple values
- Logical operators let you combine comparators
- **and, or, not**

Logical Operators and

- If both operands are true, then the statement is true
- $(2 > 1) \text{ and } (2 < 3)$: True
- $(2 > 1) \text{ and } (2 > 3)$: False

and Truth Table		
Operand 1	Operand 2	Output
False	False	False
False	True	False
True	False	False
True	True	True

Logical Operators

or

- If either (or both) operands are true, then the statement is true
- $(2 > 1)$ or $(10 > 5)$: True
- $(2 > 1)$ or $(10 < 5)$: Still True
- $(2 < 1)$ or $(10 < 5)$: False

or Truth Table		
Operand 1	Operand 2	Output
False	False	False
False	True	True
True	False	True
True	True	True

Logical Operators

not

- Inverts (reverses) the statement
- `not True` : False
- `(5 > 2)` : True
- `not(5>2)` : False

not Truth Table	
Operand 1	Output
False	True
True	False

Logical Operators

Evaluation

- Can combine, might get complicated
- Break down
- $(10 > 5)$ and not $(5 < 3)$
- True not (False)
- True True
- Overall, True

If Statements

- If a condition is true, then do something
- Multi-line statements, end in a colon :
- Everything included in the if block has to be indented to the same level
- Standard is 4 spaces or a tab

If 5 > 2:

```
    print("True!")
```

```
    print("Still in the same block!")
```

```
print("This is not in the if block")
```

If Statements

One Path - if

Check if numbers are equal

number = 5

if number == 5:

print("Equal!")

If Statements

Two Paths - if/else

Checking if strings are equal

password = 'bob'

guess = input("Enter the password: ")

if guess == password:

 print("Correct!")

else:

 print("Incorrect!")

If Statements

Multiple Paths - if/elif/else

Checking a number's sign

```
number = int(input("Enter a number: ")) # remember the data type cast
```

```
if number > 0:
```

```
    print("Positive")
```

```
elif number < 0:
```

```
    print("Negative")
```

```
else:
```

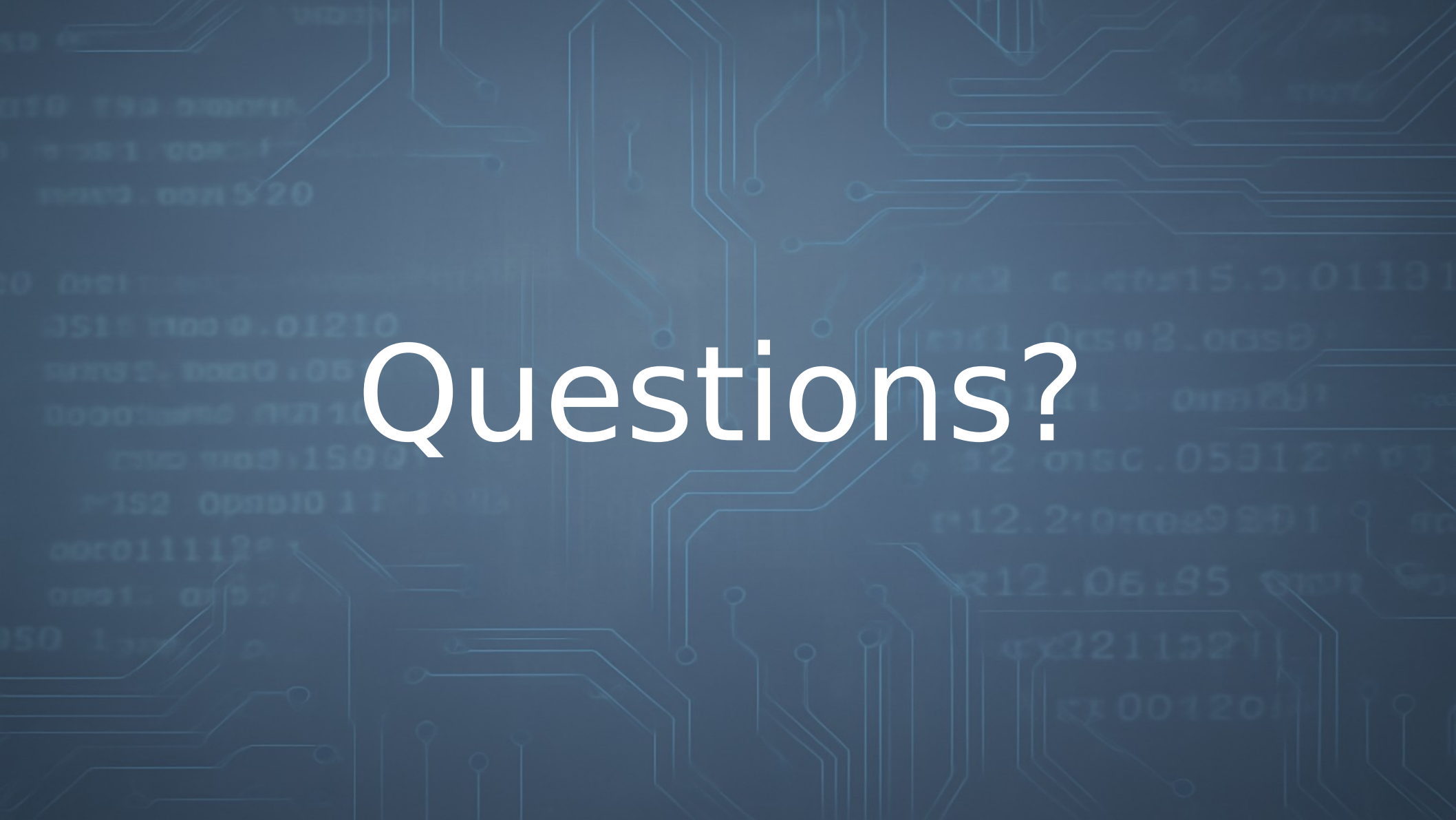
```
    print("Zero")
```

If Statements

Exercise Start

```
print("Choose an option:")  
print("a) Add")  
print("b) Subtract")  
print()  
selection = input("Please select a or b: ")
```

- Use if, elif, and else statements to add or subtract based on the menu selection
- Ask for 2 numbers
- Display the result
- If they don't enter a or b, then display an error message



Questions?