

# Information, Computation, Communication

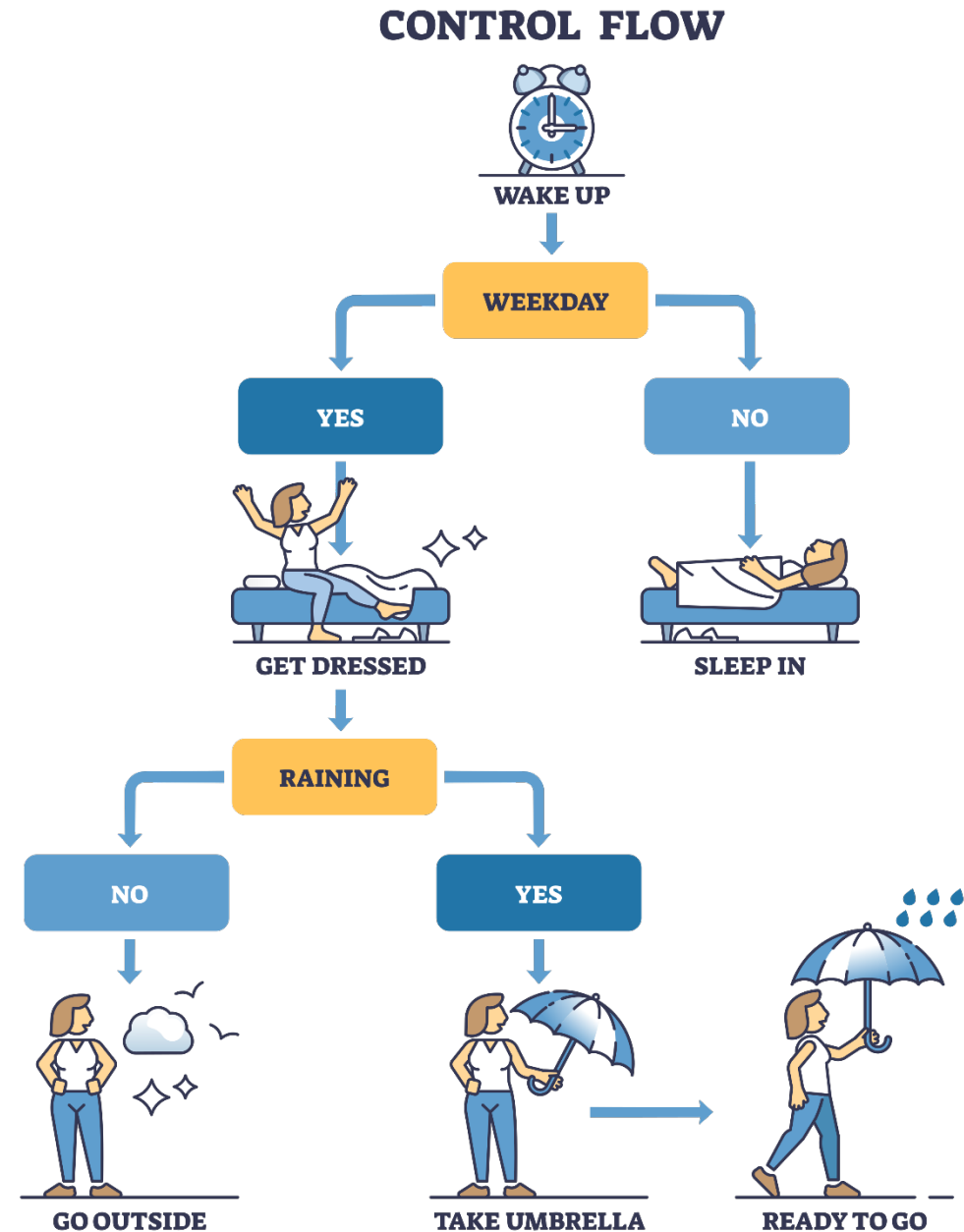
# Learning Python

if-elif-else

# Agenda

- [if-else](#)
- [if-else ternary operator](#)
- [if-elif-else](#)

Next topic: Loops

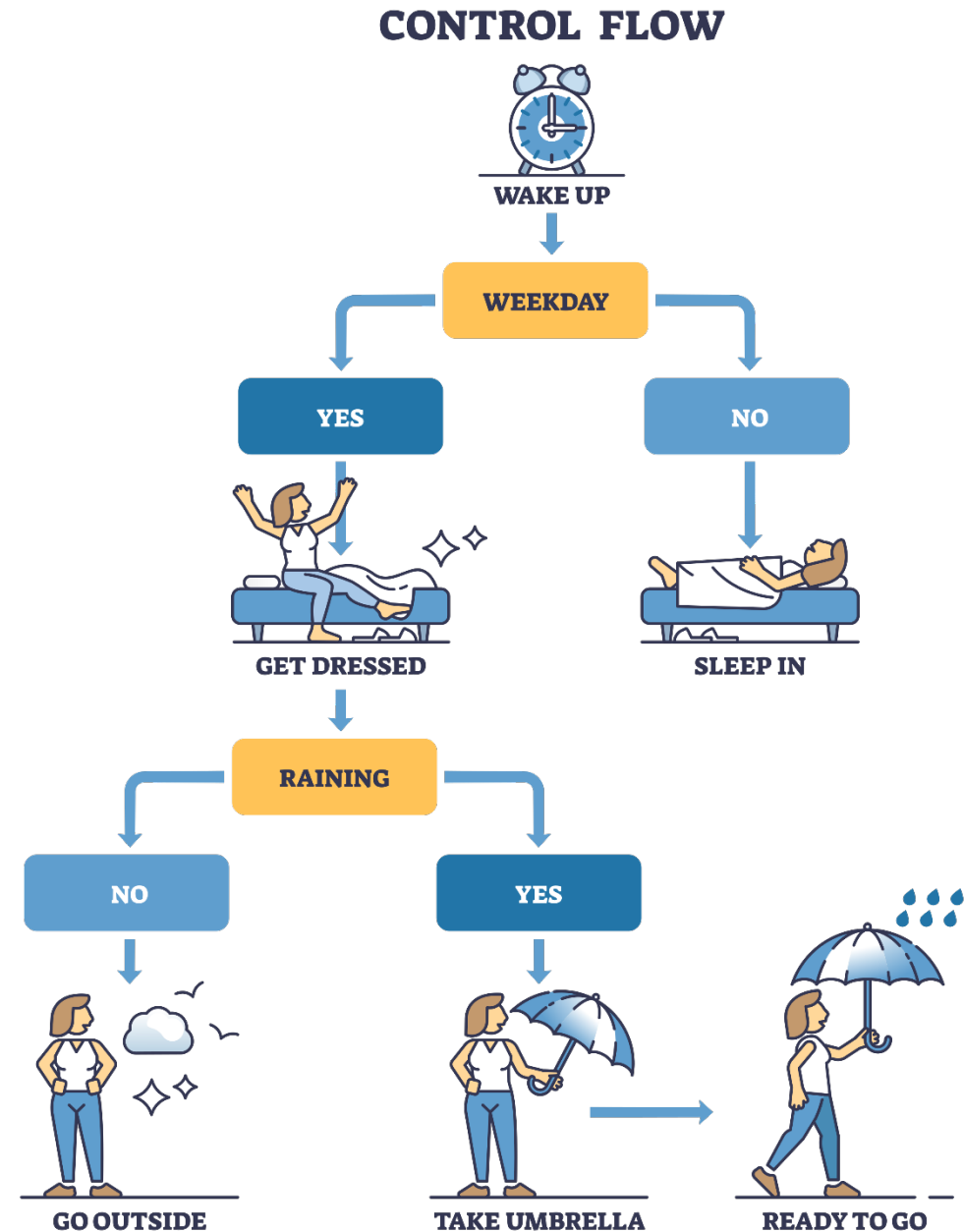




# If-else Statements

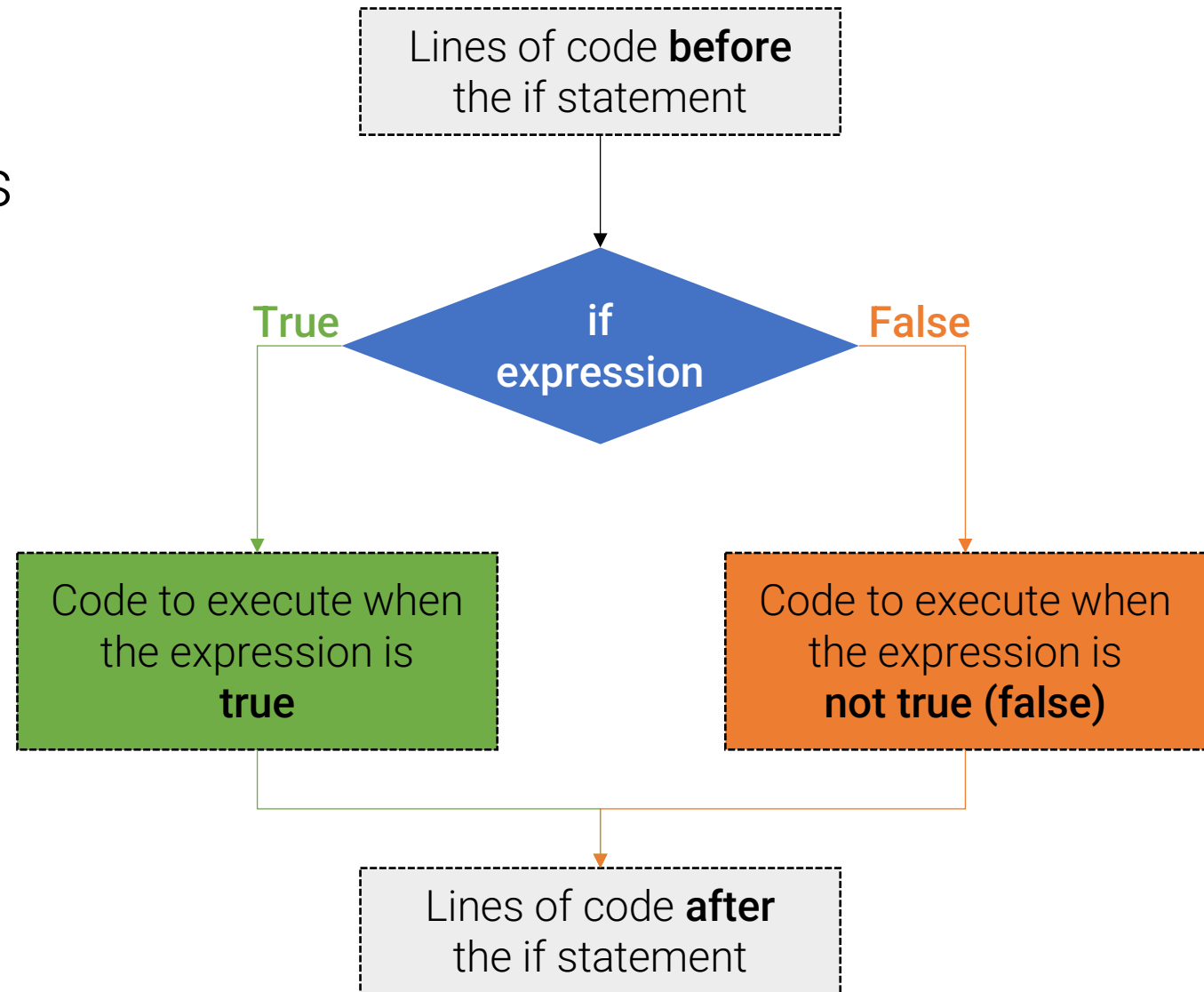
# if-else Statements

- Allow a program to **choose** which groups of instructions (code blocks) to execute based on an expression evaluated as **true** or **false**



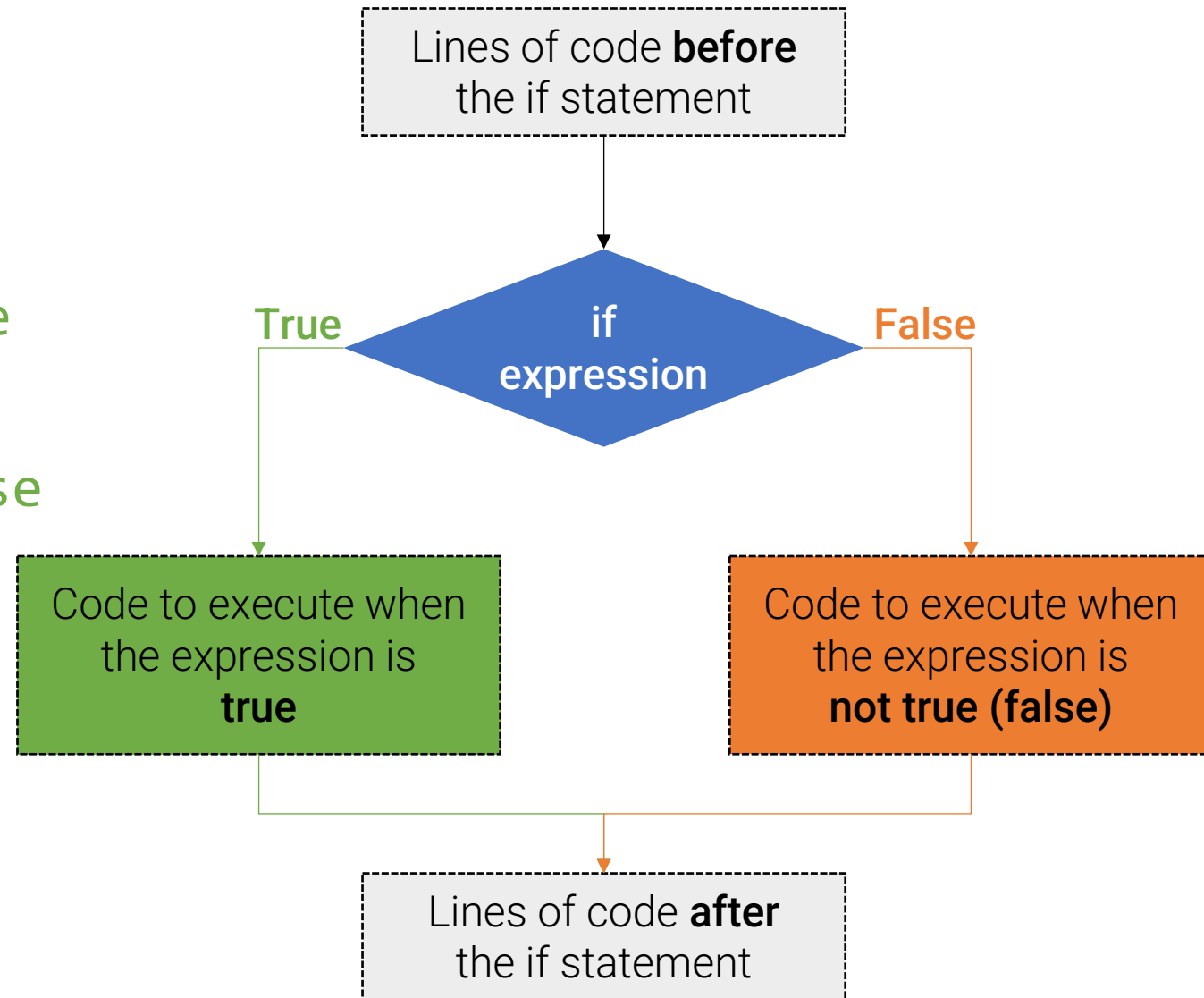
# if-else Statements

- Allow a program to **choose** which groups of instructions (code blocks) to execute based on an expression evaluated as **true** or **false**



# if-else Statements

```
if expression: # evaluate
    block1      # do when true
else:          # optional
    block2      # do when false
```



# ◀ if-else Statements

```
• if expression:
•     block1
• else:
•     block2
```

*Indentation defines  
block boundaries*

- In Python, the instructions within the block (i.e., **block boundaries**) are detected **automatically**, through **indentation**
- Python does not require special delimiting characters, often found in other programming languages, such as
  - opening { and closing } braces
  - **begin** and **end** delimiters
  - **semicolon** at the end of a line, etc.

# Examples

## if-else

**Q:** Write a piece of code that checks if an integer variable **x** is an odd or an even number and prints out a corresponding message

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## if-else

**Q:** Write a piece of code that checks if an integer variable **x** is an odd or an even number and prints out a corresponding message

```
x = input("Enter an integer number...") # returns a string
x = int(x) # converts the string to an integer
```

```
# Solution1: start by testing if the remainder
# of the division by two is zero
```

```
if x % 2 == 0:
    print(x, "is even")
else:
    print(x, "is odd")
```

# Examples

## if-else

**Q:** Write a piece of code that checks if an integer variable **x** is an odd or an even number and prints out a corresponding message

```
x = input("Enter an integer number...") # returns a string
x = int(x) # converts the string to an integer
```

```
# Solution1: start by testing if the remainder
# of the division by two is zero
```

```
if x % 2 == 0:
    print(x, "is even")
else:
    print(x, "is odd")
```

*Examples of running the program:*



Enter an integer number...10  
10 is even

Enter an integer number...7  
7 is odd

# Examples

## if-else

**Q:** Write a piece of code that checks if an integer variable **x** is an odd or an even number and prints out a corresponding message

```
x = input("Enter an integer number...")  
x = int(x)
```

```
# Solution2: start by testing if the remainder  
# of the division by two is different than zero  
if x % 2 != 0:  
    print(x, "is odd")  
else:  
    print(x, "is even")
```

# Examples

## if-else

What are the values of the following expressions, assuming **x** to be an odd integer?

```
y = x % 2 != 0
```

```
# Answer: y = True
```

```
w = x % 2
```

```
# Answer: w = 1
```

```
z = y == w
```

```
# Answer: z = True
```

Takeaway message:

`if x%2`

and

`if x%2 != 0`

have the same effect

*Verify this by also checking  
the case when x is an even integer*

# if-else Ternary Operator

- Consider the following simple if-else statement:

```
if X:
    result = Option1
else:
    result = Option2
```

- These four lines of code can be replaced by a single line using the **if-else ternary operator**:

```
result = Option1 if X else Option2
```

# Examples

## If-else

**Q:** People aged between 10 and 80 are allowed to ride on a roller coaster. Write a piece of code that, for a given integer **age**, outputs **OK** if the person is admitted and **Not admitted** otherwise.

# Examples

## If-else

**Q:** People aged between 10 and 80 are allowed to ride on a roller coaster. Write a piece of code that, for a given integer **age**, outputs **OK** if the person is admitted and **Not admitted** otherwise.

```
# Version with if-else
```

```
age = int(input("What is your age..."))
```

```
output_message = "Not admitted" # variable initialization  
                                # is optional, but good practice
```

```
if 10 <= age <= 80:
```

```
    output_message = "OK"
```

```
else:
```

```
    output_message = "Not admitted"
```

```
print(output_message)
```

# Examples

## If-else Ternary Operator

**Q:** People aged between 10 and 80 are allowed to ride on a roller coaster. Write a piece of code that, for a given integer **age**, outputs **OK** if the person is admitted and **Not admitted** otherwise.

```
# Version with if-else ternary operator
```

```
age = int(input("What is your age..."))
```

```
output_message = "OK" if 10 <= age <= 80 else "Not admitted"
```

```
print(output_message)
```



# if-elif-else Statements

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- The if-elif-else allows multiway branching

```
if expression1:    # evaluate
    block1         # do when expression1 is true

elif expression2:  # evaluate
    block2         # do when expression1 is false
                  # but expression2 is true

else:             # optional else
    block3         # do when both expressions are false
    block 4       # do irrespective of expressions 1&2
```

# Examples

## if-elif-else

**Q:** Given a piece-wise linear function  $f()$  write a program that takes a number  $x$  and computes and outputs  $f(x)$

$$f(x) = \begin{cases} -x - 3 & \text{if } x \leq -3 \\ x + 3 & \text{if } -3 < x < 0 \\ -2x + 3 & \text{if } 0 \leq x < 3 \\ 0.5x - 4.5 & \text{if } x \geq 3 \end{cases}$$

# Examples

## if-elif-else

**Q:** Given a piece-wise linear function  $f()$  write a program that takes a number  $x$  and computes and outputs  $f(x)$

```
# Solution 1, with independent if statements
x = float(input("Enter a number..."))

if x <= -3:
    f_x = -x - 3
if -3 < x < 0:
    f_x = x + 3
if 0 <= x < 3:
    f_x = -2 * x + 3
if x >= 3:
    f_x = 0.5 * x - 4.5

print(f_x)
```

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## if-elif-else

**Q:** Given a piece-wise linear function  $f()$  write a program that takes a number  $x$  and computes and outputs  $f(x)$

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# Solution 1, with independent if statements
x = float(input("Enter a number..."))
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```
if x <= -3:
    f_x = -x - 3
if -3 < x < 0:
    f_x = x + 3
if 0 <= x < 3:
    f_x = -2 * x + 3
if x >= 3:
    f_x = 0.5 * x - 4.5

print(f_x)
```

```
# Solution 2, with if-elif-else
# grouping related statements together
x = float(input("Enter a number..."))
if x <= -3:
    f_x = -x - 3
elif -3 < x < 0:
    f_x = x + 3
elif 0 <= x < 3:
    f_x = -2 * x + 3
else:
    f_x = 0.5 * x - 4.5
print(f_x)
```





Next topic: **Loops**