

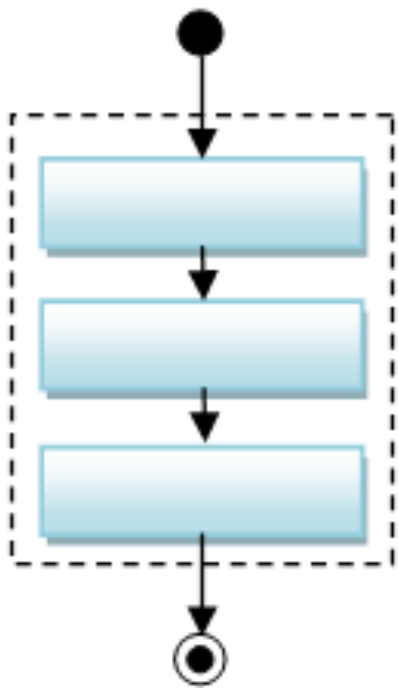
Week 3

Python

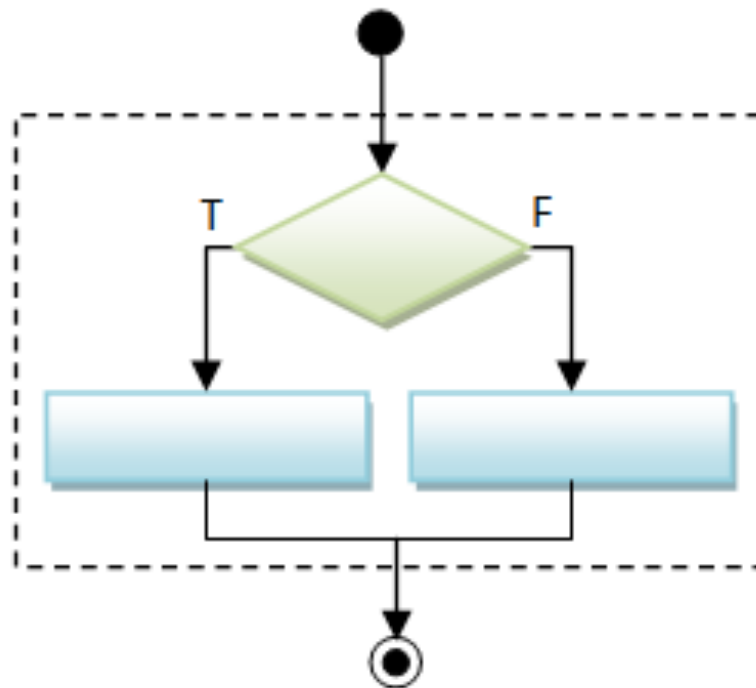
see <https://www.tiobe.com/tiobe-index/>

see https://redmonk.com/sogrady/files/2021/03/lang.rank_.0121.wm_.png

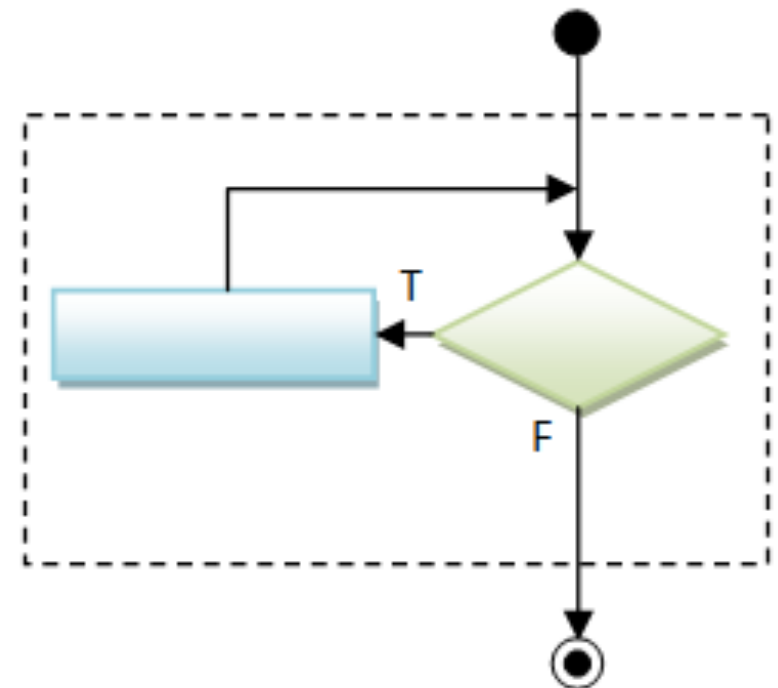
Flow of Control



Sequential



Conditional (Decision)



Loop (Iteration)

Sequential Flow of Control



```
name = input ("What's your name? ")
```



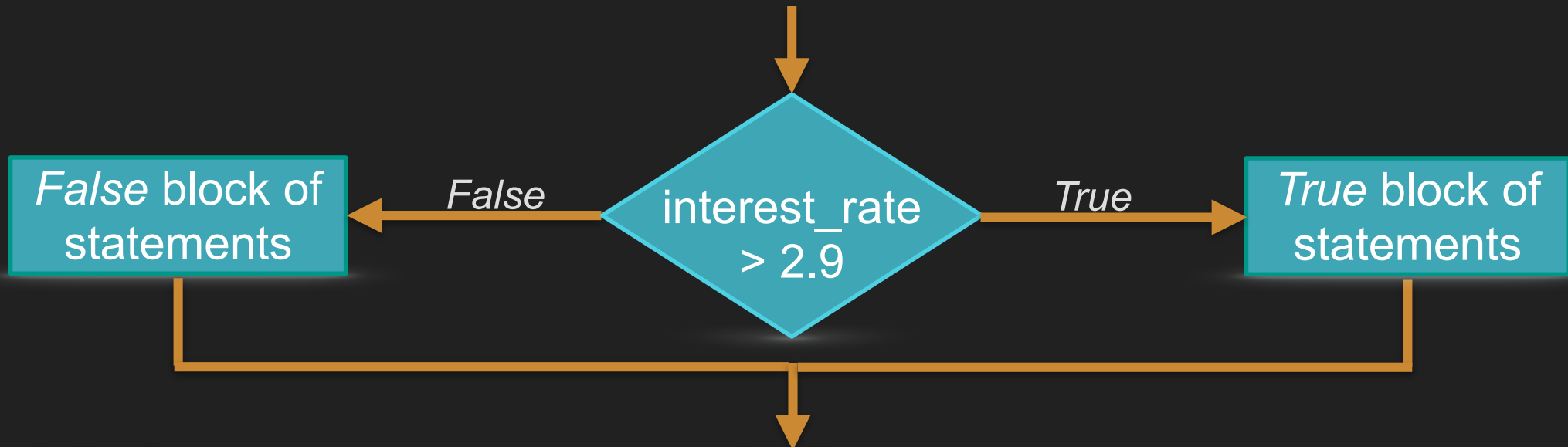
```
interest_rate = input ("What's your rate of interest? ")
```



```
print (name, "— your rate of interest equals", interest_rate, "percent")
```



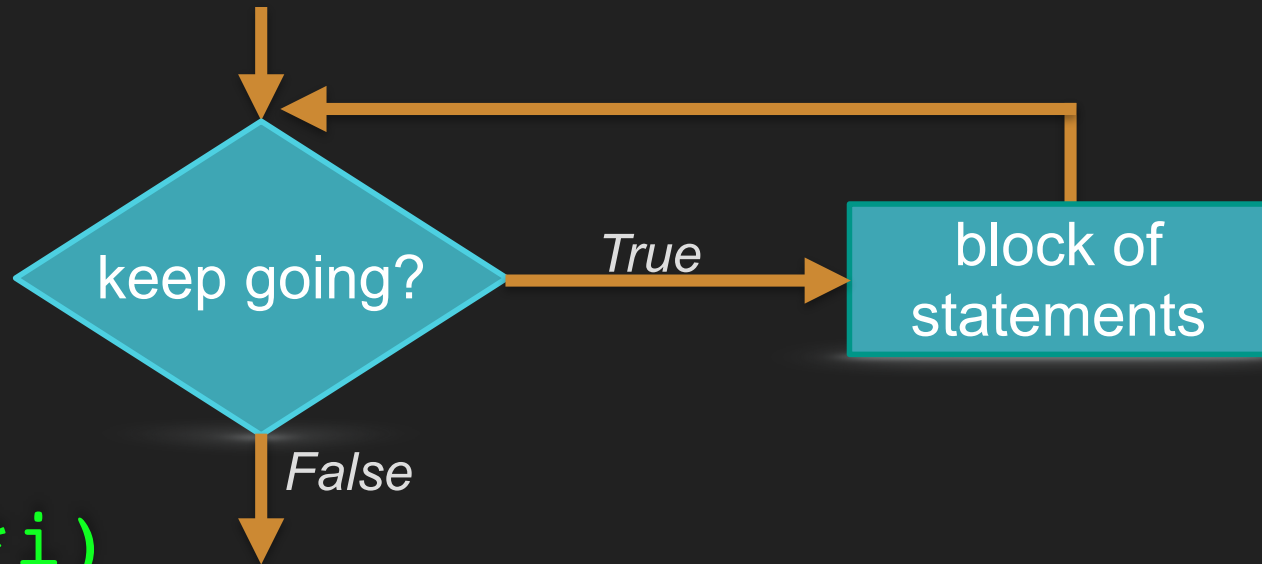
Conditional Flow of Control



```
if interest_rate > 2.9 :  
    print ("Good rate!")  
else:  
    print ("Seems low")
```

*Will this simple
addition actually
execute?*

Repetition Flow of Control



```
while i < 8:  
    print (i + i*i)
```

```
for i in range (1, 8, 2):  
    print (i + i*i)
```

What Could Possibly Go Wrong?



What Could Possibly Go Wrong?

- overflow/underflow errors
- floating-point imprecision
- data type conversion (Ariane 5)
- what else?

$$\sum_{i=1}^{10} 0.1$$

- Edsger Dijkstra: *testing can prove the presence of bugs; however, except in rare cases where you try every possible input, it cannot prove the absence of bugs.*

<https://www.youtube.com/watch?v=MVI87HzfskQ>



<https://www.youtube.com/watch?v=AGI371ht1N8>

#1

ARIANE-5



Algorithm

- Machine-independent definition of computer science: "The study of algorithmic processes."
- Muḥammad ibn Mūsā al-Khwārizmī ...



Find the average price of a stock over a 5 day period

- naive approach (see file stock1.py)
- *heuristic* approach: how would you accomplish the task in “real life” ?



heuristic
approach:
SIMPLIFY

Your task: in the file **mario.py** write a program that outputs the inverse of the right-aligned half pyramid: i.e., print a left-aligned half pyramid of height **n**:

```
#  
##  
###  
####  
#####  
#####
```

the output when n equals 6

Note that each hash character is a bit taller than it is wide, so don't worry that the half pyramid itself is taller than it is wide!

```
#
```

the output when n equals 1

```
#  
##
```

the output when n equals 2

Next ...

Your program should prompt the user for an integer n whose value is between 1 and 8, inclusive, re-prompting the user (again and again as needed) if his or her input is less than 1 or greater than 8.

Then print a *left-aligned* half pyramid of that height.

Finally ...

Let's now right-align that left-aligned half pyramid by pushing its hashes to the right — by prefixing them with dots (.) For example, if n equals 8, our output should look like this:

```
.....#
.....##
.....###
....####
...#####
..#####
.#####
#####
```

Python Data Types

Simple

- int
- float
- bool
- str

Complex

- range
- list `[1, 3, 4, 4, 4, 5]`
- set `{1, 3, 4, 4, 4, 5}`
- dict `d={}` `d ['henry'] = 35`
- tuple `(0, 0)`