Bunny Races in Python3

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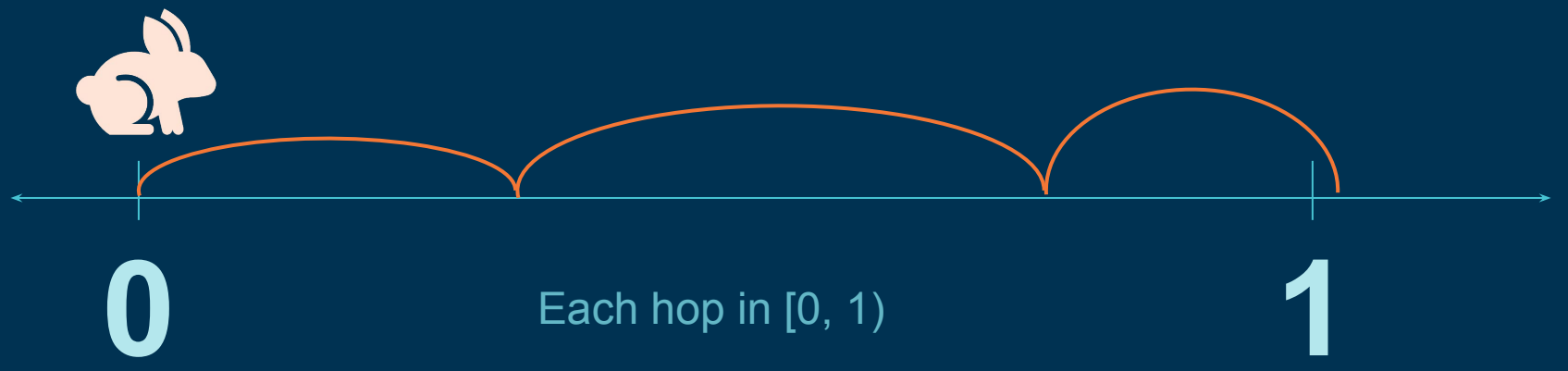
The Basics

Bunny Races in Python3

Welcome to the Bunny Races!



How many hops, on average, will it take the bunny to finish a race?

Expected Outcomes: Monitored and Summarized

```
===== Bunny Races! =====
How many bunnies to race? ('0' to quit): 5
Show each run? (y/n): y
1: 2
2: 4
3: 6
4: 2
5: 3
----- Summary Statistics -----
n = 5
Sum = 17
Average = 3.4
Minimum = 2
Maximum = 6
Frequencies:
[0, 2, 1, 1, 0, 1]
How many bunnies to race? ('0' to quit): 0

Thanks for using our app!
```

```
===== Bunny Races! =====
How many bunnies to race? ('0' to quit): 5000
Show each run? (y/n): n
----- Summary Statistics -----
n = 5000
Sum
```

Censored!

```
, 322, 167, 25, 6]
How many bunnies to race? ('0' to quit): 0

Thanks for using our app!
```

Python3 Coding Framework

Bunny Races in Python3

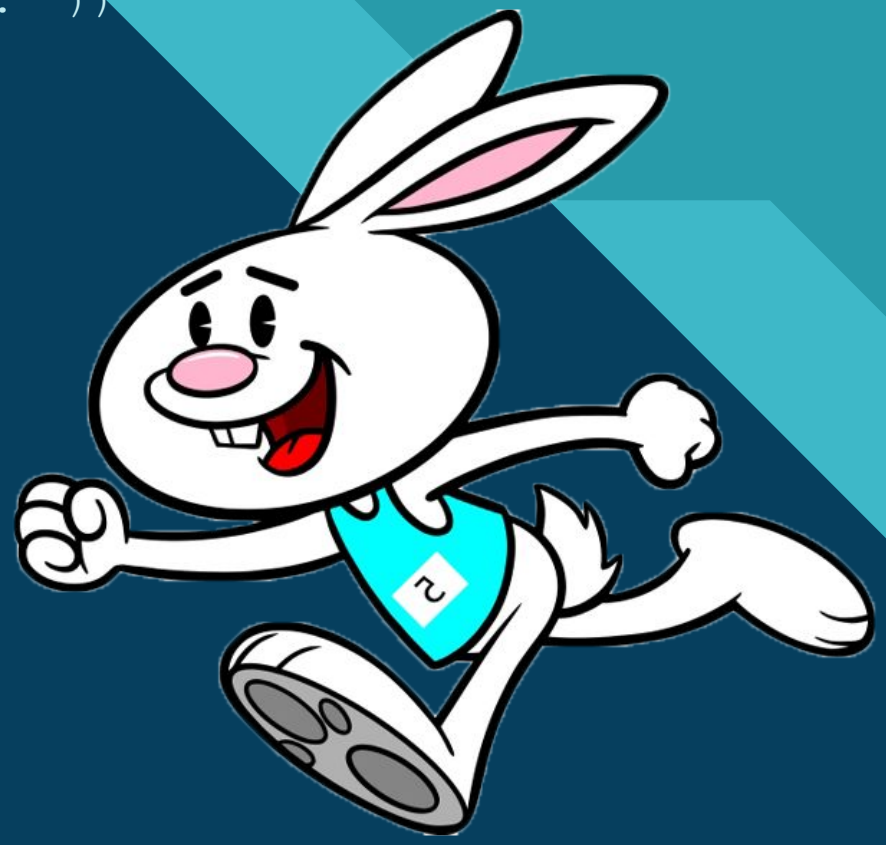
Python3 “Stub”

```
"""
Exercise:
Coder:
Date:
"""


#----- imports -----------------------------------------------------
#----- global variables --------------------------------------------
#----- my functions ------------------------------------------------
#----- main event --------------------------------------------------
#----- sample output -----------------------------------------------
```

Bunny Races: The 'main event'

```
print("===== Bunny Races! =====")
while True:
    n = int(input("How many bunnies to race? ('0' to quit): "))
    if n <= 0:
        break
    show_each_run = input("Show each run? (y/n): ")
    show_each_run = show_each_run.lower()[0]
    if show_each_run == "y":
        show_runs = True
    else:
        show_runs = False
    hops = []
    for b in range(1, n+1, 1):
        num_hops = race_a_bunny()
        if show_runs:
            print(str(b) + ": " + str(num_hops))
        hops.append(num_hops)
    #end for loop
    stats(hops)
#end while loop
print("\nThanks for using our app!")
```



Racing Secrets

Random Stuff

```
import random
a_hop = random.random()
#a float in [0, 1)
```

Function Stuff

```
def race_a_bunny():
    pass
#end function race_a_bunny

def stats(lst):
    pass
#end function stats
```

Statistical Stuff

```
Given: lst = [2, 3, 2, 7, 2, 9, 4, 3, 2, 3]
```

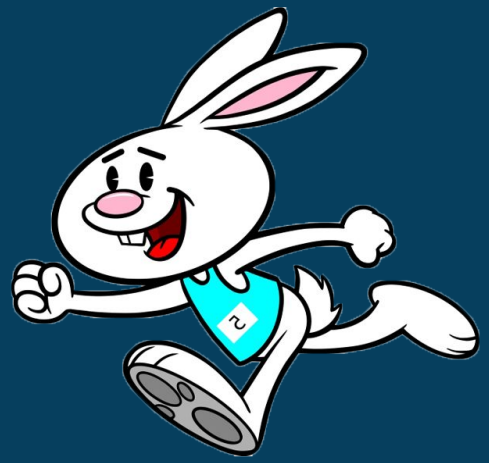
1. `n = len(lst) #len function: number of elements`
2. `a_sum = sum(list)`
3. `a_min = min(lst)`
4. `a_max = max(lst)`
5. `freq = [0] * a_max # create a list to house hops!`

Sometimes using built-in functions is easier than using ‘brute force’ but sometimes it’s also instructive to use ‘brute force’ to make sure you understand a process

Bunny Races: race_a_bunny function

```
def race_a_bunny():
    b = 0 #starting location for a bunny
    hops = 0 #accumulator
    while b < 1:
        hops += 1
        b += random.random() #gives numbers in [0, 1)
    #end loop

    return hops
#end function race_a_bunny
```



Bunny Races: stats function

```
def stats(lst):
    print("----- Summary Statistics -----")
    n = len(lst)
    print("n = " + str(n))
    a_sum = sum(lst)
    print("Sum = " + str(a_sum))
    an_avg = a_sum/n      #dwr! Data type?!
    print("Average = " + str(an_avg))
    a_min = min(lst) #built-in!
    print("Minimum = " + str(a_min))
    #For fun: find 'max' with brute force, not the built-in: a_max = max(lst)
    #assume the max is the first element in the list
    a_max = lst[0]
    for v in lst:
        if v > a_max:
        a_max = v
    #end for loop
    print("Maximum = " + str(a_max))
```

To be continued...

Bunny Races: stats function continued

```
def stats(lst):
    #frequency analysis
    print("Frequencies:")
    freq = [0]*a_max
    #iterate through lst, collecting frequencies
    for v in lst:
        freq[v-1] += 1
    #end for loop
    print(freq)
#end function stats
```

CodeHS!

https://codehs.com/sandbox/techtoolsguru/bunnyracespy3-start

- Avoid using variable names that are the same as function names
- Use meaningful, self-documenting variable names
- Never create a while loop that has no way of ending – provide a 'reachable' break
- Before doing something by 'brute force' ask: is there a built-in function that can do the job?
- It's 'good practice' to show that an app has ended (it's also very courteous!)
- If you ask for input, include a 'hint' as to what you want them to provide
- Assume the worst when users provide input and code accordingly
- When given a project, look to see if any sample output is provided
- Remember to str numeric output when necessary
- Watch out with *ANY* division use!
- Use meaningful comments
- Mark the end of major code blocks

Expected Outcomes: Monitored and Summarized

```
===== Bunny Races! =====
How many bunnies to race? ('0' to quit): 5
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----- Summary Statistics -----
n = 5
Sum = 17
Average = 3.4
Minimum = 2
Maximum = 6
Frequencies:
[0, 2, 1, 1, 0, 1]
How many bunnies to race? ('0' to quit): 0

Thanks for using our app!
```

```
===== Bunny Races! =====
How many bunnies to race? ('0' to quit): 5000
Show each run? (y/n): n
----- Summary Statistics -----
n = 5000
Sum = 13577
Average = 2.7154
Minimum = 2
Maximum = 7
Frequencies:
[0, 2478, 1702, 622, 167, 25, 6]
How many bunnies to race? ('0' to quit): 0

Thanks for using our app!
```

What we learn with pleasure, we never forget

- Alfred Mercier

https://codehs.com/sandbox/techtoolsguru/bunnyracespy3-final

Thank You!

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