FINE 434: FinTech

Lecture 4

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print

print(x) prints x to the console

```
1  x = 10
2
3  print(x)
4
5  y = "a phrase"
6
7  print(y)
```

```
10
a phrase
```

While Loop

The while loop is similar to an if statement: it executes the code inside of it if some condition is true. The difference is that the while loop will continue to execute as long as the condition is true. In other words, instead of executing if something is true, it executes while that thing is true. Note the syntax!

While Loop

The while loop is similar to an if statement: it executes the code inside of it if some condition is true. The difference is that the while loop will continue to execute as long as the condition is true. In other words, instead of executing if something is true, it executes while that thing is true. Note the syntax!

```
n = 1
s = 0

while n <= 10:
    s = s + n*n
    n = n + 1
```

What does this code execute?

Application: Option Pricing

I have a fair coin (i.e. Pr(Heads) = Pr(Tails) = $\frac{1}{2}$).

I will flip the coin repeatedly until I see tails and count the number of consecutive heads. Let's call the number of consecutive heads X. I offer you the following option: pay me P dollars now for an option to get X dollars in exchange for 1 dollar once you know X.

What is the fair value of P? (i.e. Assume you are risk-neutral... how much would you pay for this option?)

Digression: importing

Python possesses many modules with functions that make your life easier.

You may need to **import** these modules to use their functions.

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You may need to **import** these modules to use their functions.

To import a module, write “import ...” at the top of your file.

e.g. If you want to generate random numbers, you may want to use the random package.

To use that package, write:

import random

Application: Option Pricing

import random # this is how you tell Python that you want to use the random package
# HINT: random.randint(1,2) gives 1 or 2 with equal probability

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import random # this is how you tell Python that you want to
use the random package
# HINT: random.randint(1,2) gives 1 or 2 with equal probability
n = 1
N = 10000
P = 0
K = 1
while n <= N:
    X = 0.0



    P = P + max(X - K,0)/N
    n = n+1
P
```

Application: Option Pricing

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use the random package
# HINT: random.randint(1,2) gives 1 or 2 with equal probability
n = 1
N = 10000
P = 0
K = 1
while n <= N:
    X = 0.0
    while random.randint(1,2) != 1:
        X = X + 1.0
    P = P + max(X - K,0)/N
    n = n+1
P
```

Application: Option Pricing

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import random # this is how you tell Python that you want to
use the random package
# HINT: random.randint(1,2) gives 1 or 2 with equal probability
n = 1
N = 10000
P = 0
K = 1
while n <= N:
    X = 0.0
    while random.randint(1,2) != 1:
        X = X + 1.0
    P = P + max(X - K,0)/N
    n = n+1
P # In general, P = 1/2^K
```

Infinite Loop

```
while n <= 10:
    s = s + n*n
    s = s + 1
n = n + 1
```

What's wrong with this code?

For Loops

A for loop is an alternative to a while loop.

e.g

text = “this is text”

```
for i in text:
    print(i)
```

Note: counter is implicit

Your Turn

Write code to count the number of words in a sentence. Assume that each word is separated by spaces but that there may be spaces at the start or end.

sentence = “ this is an unusually formatted   sentence. ”
# Your code below

Your Turn

Write code to count the number of words in a sentence. Assume that each word is separated by spaces but that there may be spaces at the start or end.

```
sentence = “  this is  an unusually formatted   sentence. ”
# Your code below
wordcount = 0
currentlyreadingaword = False
for n in sentence:
    if n != “ ” and (not currentlyreadingaword):
        wordcount = wordcount + 1
        currentlyreadingaword = True
    elif n == “ ” and currentlyreadingaword:
        currentlyreadingaword = False
```

range(a,b,c)

range(a,b) produces numbers from a to b-1

range(a,b,c) produces every cth number from a to b-1, starting from a

```
1  x = range(1,10,2)
2
3  for i in x:
4      print(i)
```

```
1
3
5
7
9
```

Your Turn

Let n $>$ 2 be some integer. Is n prime?

n = ...
# Your code below

Your Turn

Let n $>$ 2 be some integer. Is n prime?

```
n = ...
# Your code below

prime = True

for i in range(2,n):
    if n % i == 0:
        prime = False
        i = n # breaks out of the loop; could also use break
```