Python 101

Lecture Slide - 04

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for and range

`range` is function that returns an iterable object. Any iterable object can be iterated by `for` statement.

`range(n)` can be used to iterate n times. It yields numbers from `0` to `n-1`.

range.py

```
for i in range(5):
    print(i)
```

output

```
0
1
2
3
4
```

for and range

`range(start, stop)`

It will return an iterable that yields numbers from `start` to `stop-1`.

range.py

```
for i in range(1, 6):
    print(i)
```

output

```
1
2
3
4
5
```

Multiple statements inside if

Print all the odd numbers from 1 to 10

odd.py

```
for i in range(1, 11):
    if i % 2 == 1:
        print(i)
```

output

```
1
3
5
7
9
```

for and range

`range(start, stop, step)`

It will return an iterable that yields numbers from `start` to `stop-1` by incrementing by `step`.

range.py

```
for i in range(1, 11, 2):
    print(i)
```

output

```
1
3
5
7
9
```

Print without new line

`end=''`

Can be passed to `print` function. This will tell `print` function to not to print new line `\n` at the end of the printing.

range.py

```
for i in range(1, 6):
    print(f'{i} ', end='')
```

output

```
1 2 3 4 5
```

while loop

While loops repeat as long as given boolean condition is met.

while.py

```
count = 1
# just like if you can write
# any conditional expression
while count <= 5:
    print(count)
    count += 1
    # same as count = count + 1

print('done!')
```

output

```
1
2
3
4
5
done!
```

Shortcut operators

Operator	Example	Same as
+=	x += 1	x = x + 1
-=	x -= 2	x = x - 2
*=	x *= 2	x = x * 2
/=	x /= 2	x = x / 2
%=	x %= 2	x = x % 2
**=	x **= 3	x = x ** 3
//=	x //= 2	x = x // 2

Nesting loops

nesting1.py

```
for i in range(5):
    for j in range(5):
        print(f'{i},{j} ', end='')
    print()
```

output

```
0,0 0,1 0,2 0,3 0,4
1,0 1,1 1,2 1,3 1,4
2,0 2,1 2,2 2,3 2,4
3,0 3,1 3,2 3,3 3,4
4,0 4,1 4,2 4,3 4,4
```

Nesting loops

nesting2.py

```
for i in range(1, 6):
    for j in range(i):
        print(f'{i},{j} ', end='')
    print()
```

output

```
1,0
2,0 2,1
3,0 3,1 3,2
4,0 4,1 4,2 4,3
5,0 5,1 5,2 5,3 5,4
```

Nesting loops

Write a program to take width and height of a rectangle as input and print a rectangle made out of asterisks.

rectangle.py

```
w = int(input('Enter width: '))
h = int(input('Enter height: '))

for i in range(h):
    for j in range(w):
        print(f'*', end='')
    print()
```

output

```
Enter width: 5
Enter height: 3
*****
*****
*****
```

break statement

`break` is used to exit a `for` loop or a `while` loop

break1.py

```
count = 1
while count <= 5:
    print(count)
    count += 1
    if count > 3:
        break

print('outside')
```

output

```
1
2
3
outside
```

break statement

`break` is used to exit a `for` loop or a `while` loop

break2.py

```
for i in range(1, 6):
    print(i)
    if i > 2:
        break

print('outside')
```

output

```
1
2
3
outside
```

continue statement

`continue` is used to skip the current block, and return back to the loop

continue1.py

```
count = 0
while count < 5:
    count += 1
    if count == 3:
        continue
    print(count)

print('outside')
```

output

```
1
2
4
5
outside
```

continue statement

`continue` is used to skip the current block, and return back to the loop

continue2.py

```
for i in range(1, 6):
    if i == 3:
        continue
    print(i)

print('outside')
```

output

```
1
2
4
5
outside
```

Primality test

prime.py

```
n = int(input("Enter number: "))
prime = True

for i in range(2, n):
    if n % i == 0:
        prime = False
        break

if prime:
    print('prime')
else:
    print('not prime')
```

output1

```
Enter number: 4
not prime
```

output2

```
Enter number: 7
prime
```

output3

```
Enter number: 1
prime
```

Primality test (bug fixed)

prime.py

```
n = int(input("Enter number: "))
prime = True
if n <= 1:
    prime = False

for i in range(2, n):
    if n % i == 0:
        prime = False
        break

if prime:
    print('prime')
else:
    print('not prime')
```

output1

```
Enter number: 4
not prime
```

output2

```
Enter number: 7
prime
```

output3

```
Enter number: 1
not prime
```

Single line if else

prime.py

```
n = int(input("Enter number: "))
prime = True if n > 1 else False

for i in range(2, n):
    if n % i == 0:
        prime = False
        break

if prime:
    print('prime')
else:
    print('not prime')
```

output1

```
Enter number: 4
not prime
```

output2

```
Enter number: 7
prime
```

output3

```
Enter number: 1
not prime
```

Reversing a number

Write a program to take an integer from user and print its reverse number.

reverse.py

```
n = int(input("Enter number: "))
rev = 0
while n > 0:
    unit = n % 10
    rev = rev*10 + unit
    n //= 10

print('reverse is', rev)
```

output

```
Enter number: 12345
reverse is 54321
```

Assignments

- WAP to print all the numbers divisible by 3 or 5 between 1 to 25 (inclusive)
- WAP to print all the numbers divisible by 3 and 5 between 1 to 99 (inclusive)
- WAP to print the sum of all the odd natural numbers below 99
- WAP to print triangle from asterisks
- WAP to print first ‘n’ (take n from user) prime numbers
- WAP to print first ‘n’ Fibonacci numbers
- WAP to print the largest factor of ‘n’
- WAP to print the number of digits in ‘n’
- WAP to print the sum of the digits in ‘n’
- WAP to calculate ${}^{n}P_{r}$ and ${}^{n}C_{r}$ by taking n and r from user.

* WAP is Write a program

Assignments

Calculate the sum of these series:

$1^2 - 2^2 + 3^2 - 4^2 + ...n^2$

log 2 $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - ...\frac{1}{n}$

e $1 + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \frac{1}{5!} + ...\frac{1}{n!}$

e**-x $1 - \frac{x}{1!} + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - ...\frac{x^n}{n!}$

log(1+x) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5} - ...\frac{x^n}{n}$

$1.2 + 3.4 + 5.6 + ... + (2n-1)(2n)$

2**n $\binom{n}{0} + \binom{n}{1} + \binom{n}{2} + ... + \binom{n}{n}$

(x+1)**n $\binom{n}{0}x^0 + \binom{n}{1}x^1 + \binom{n}{2}x^2 + ... + \binom{n}{n}x^n$

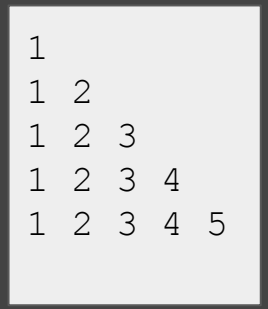
(x+1)**n $\binom{n}{0}x^n + \binom{n}{1}x^{n-1} + \binom{n}{2}x^{n-2} + ... + \binom{n}{n}x^0$

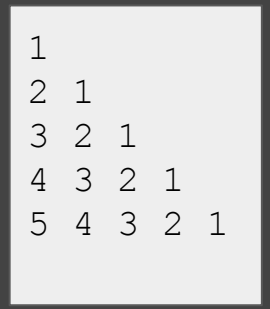
π/4 $1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - ...\frac{1}{2n+1}$

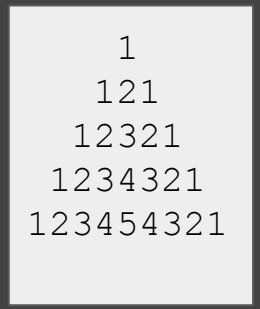
* Where n and x are user inputs

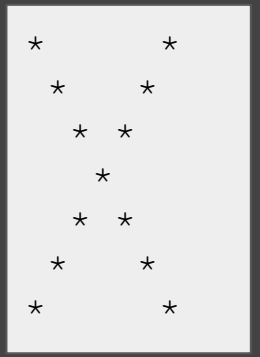
Assignments

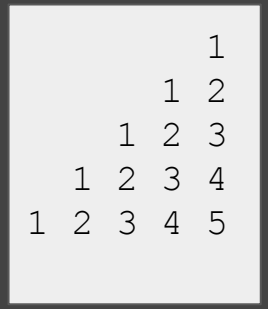
Print these patterns

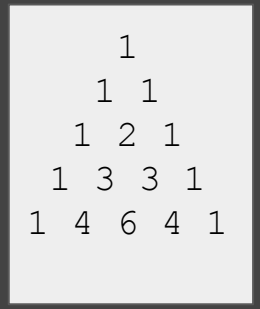


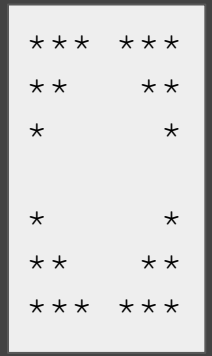












* try to generalize them with n

That's all folks!