

Repetition: Functions, Lists, Strings

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Activities

- Write a function that replaces every vowel in a string with an asterisk

Functions: Named Parameters

- Functions get parameters by
 - Position
 - By name
- Example for positional parameters:
 - ```
def func(a, b):
 return a*a*b
```
  - ```
func(3, 4)
```

 - a=3, b=4: returns 36

Functions: Named Parameters

- Example for named parameters
 - ```
def func(a,b):
 return a*a*b
```
  - Passing by named parameters
    - ```
func(b=3, a=2)
```
 - Now returns 12
- Passing by named parameters avoids mistakes and makes code clearer

Activity

- The solution of a quadratic equation $ax^2 + bx + c = 0$ is given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.
- Only works if the discriminant $b^2 - 4ac$ is positive or zero and a is not zero
- Write a function of a , b , and c that calculates the principal root (using a plus in the plus-minus)
- Print out the principal solution of $x^2 - 3x + 2$ using call by name

Functions: Default Parameters

- Sometimes we have default values for parameters
 - Example:
 - print has three default parameters:
 - sep for the separator string between arguments

```
>>> print(1, 2, 3, 4, sep='__')
```

```
1__2__3__4
```

```
>>> print(1, 2, 3, 4, sep=' **** ')
```

```
1 **** 2 **** 3 **** 4
```

Functions: Default Parameters

- print: end variable prescribes what happens after printing the last argument

```
>>> print(1, 2, 3, 4, end='\n____\n')  
1 2 3 4  
____,
```

- Here: Print new line, then underscores, then new line
- Or print white space instead of new line

```
>>> for i in range(10):  
    print(i**3, end=' ')
```

```
0 1 8 27 64 125 216 343 512 729
```

Functions: Default Parameters

- print: Third default argument
 - file
- Prints directly to a file.

Functions: Default Parameters

- To define default parameters:
 - At the end of a parameter list in a function:
 - Use the equals symbol
 - Example:

```
def dist(x1, x2, y1, y2, power=2):  
    return (abs(x1-y1)**power + abs(x2-y2)**power)**(1/power)
```

- If called with four arguments, `power = 2`
- If called with named argument for `power`, `power = that argument`

Functions: Default Parameters

- When using default arguments:
 - Almost always better to use named parameters in the call

```
>>> dist(1,3,2,4)
1.4142135623730951
>>> dist(1,3,2,4,power=3)
1.2599210498948732
>>> dist(x1=2, x2=3, y1=4, y2=5, power=1/2)
8.0000000000000002
```

Activity

- Use a default argument for $a=1$ to give the principal solution in a quadratic equation
- Hint: default arguments are at the end of the parameter list

Activity

- Give a function that calculates the arithmetic mean of a list
- Give a function that calculates the geometric mean of a list

Activities

- Give a function that takes a string as a argument and a letter as a default argument with default value ''.
- The function replaces each vowel with the default value