

More on Python Programming

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Review of `for` loops

```
# sum for  $\ln(1+x)$  -- converges when  $-1 \leq x < 1$ 
x = 0.5
N = 10
sum = 0
for i in range(1,N):
    sum = sum + float((-1)**(i+1))*float(x)/float(i)
print sum
```

Using a loop

Try this: You are given a number written in binary, say 10110_2 . Assume this is in a list `[1, 0, 1, 1, 0]`. Build the integer this represents in base 10 using a `for` loop.

Note: To find the length of a list `L`, use `len(L)`.

Using a loop

```
L = [1,0,1,1,0]
n = 0
for i in range(len(L)):
    k = (len(L)-1)-i
    n += L[i]*2**k
print n
```

Functions

Functions allow programmers to re-use bits of code after writing the code once. This is the basis of “modular design” in programming.

```
def f(n):  
    sum=0  
    for i in range(1,n+1):  
        sum+=i  
    return(sum)
```

Functions

Try this: Create a function from your code for converting a list in binary to base 10 integer.

It should take a list as input and return the number in base 10.

Functions

```
def binary_to_base10(L):  
    n = 0  
    for i in range(len(L)):  
        k = (len(L)-1)-i  
        n += L[i]*2**k  
    return n
```

Working with Lists

Lists are a very useful data type in Python. Here are some key commands when using lists. Assume `L` is a list.

- `L.append(item)` – adds ‘item’ to the end of the list
- `L.reverse()` – reverses the order of the items in `L`
- `L.sort()` – sorts the list alphabetically and numerically
- `L.pop(i)` – removes the item in the i^{th} position of `L`
- `L[i]` – accesses the i^{th} item of `L` (remember that indexing starts with $i=0$)
- `map(function,L)` – applies ‘function’ to all items in `L`

List examples

Try this:

- Create list with 6 elements.
- Append your age, name, and hometown to the list.
- Reverse the order of the list and print it on the screen.
- Sort the list and print it on the screen.
- Pop off the 4th item.
- Print the 2nd item.
- Create a list of 4 numbers.
- Create a function that squares a number and map it to your new list.

Base 10 to Binary

Review the algorithm.