

conditionals and flow control (week 2)

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Conditionals and flow control

- **Conditionals:** Do something *if* something else is true
- **Flow control:** Go to different places in the code: especially, repeat calculations
- Everything we need for interesting programs (“[the rest is commentary](#)”)
- Technically we can compute *anything*: [Turing machines](#) ([xkcd](#))

Conditionals

- Do something *if* something is true
- `if` statement ([reference](#))

```
if False:
    print("no")
```

- else-if (`elif`) and `else` clauses


```
if (x<=0):
    print("what??")
elif(x==1):
    print("one")
elif(x==2):
    print("two")
else:
    print("many")
```

- not too much else to say
- we can do more than one thing; use a *code block*

example

while

- repeat code many times, *while* some logical statement is true ([reference](#))



http://www.tutorialspoint.com/images/python_while_loop.jpg

For example:

```
x = 17
while x>1:
    x = x/2
```

Maybe we want to know how many steps that took:

```
x = 17
n = 0
while x>1:
    x = x/2
    n = n+1
```

- What is the answer?
- Can you get the same answer using `import math` and `math.log(x,2)` (and maybe `round()` or `math.floor()`)?
- We can use logical operators to combine

```
x = 17
n = 0
while x>1 and n<3:
    x = x/2
    n = n+1
```

for loops

- what if we want to repeat a fixed number of times? We could use something like

```
n = 0
while n<n_max:
    # do stuff
    n = n+1
```

Or we could use a `for` loop:

```
for n in range(0,n_max):
    # do stuff
```

- does this repeat `n_max` or `n_max+1` times? (hint: try it out, and/or use `list(range(...))` ...)
- more generally, we can use `for` to iterate over *any list*.

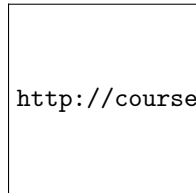


Figure 1: for loop

For example, we can write a change-writing program.

```
total=5.73
toonies = 5.73 // 2 ## integer division
total = total - 2*toonies
```

```
total = 5.73
res = [] # empty list
denoms = list(2,1,0.25,0.1,0.05)
for d in denoms:
    # do stuff
```

- start with `total`, use `denoms` above
1. program to see how many pennies are left (how could we do this much more easily?)
 2. **or** print out change as we go along
 3. **or** save results as an array

Now let's look at the [Mandelbrot program](#) again ...

Pythonicity

From [Secret Weblog](#):

```
i = 0
while i < mylist_length:
    do_something(mylist[i])
    i += 1 ## or i=i+1
```

vs.

```
for i in range(mylist_length):  
    do_something(mylist[i])
```

vs.

```
for element in mylist:  
    do_something(element)
```

Criteria:

- speed
- memory use
- simplicity (code length)
- simplicity (avoid modules)
- simplicity (avoid abstractions)
- pythonicity