Advanced Functions

Doug Blank
CS110 Fall 2009
Bryn Mawr College
Functions as Arguments

from myro import *

def hello():
    speak("Hello")

def goodbye():
    speak("Goodbye")

def dialog(f1, f2):
    f1()
    f2()

>>> dialog(hello, goodbye)
Functions that stop, and don't

```python
def infiniteLoop(parameter):
    while True:
        print "loop!"
    return

def stops(parameter):
    return "Hi Mom! Send money!"
```
Could you write a function that determines if a function will stop or not?

```python
def halts?(function, parameter):
    if function(parameter) halts:
        return True
    else:
        return False
```
Assume that you could!

```python
>>> halts?(infiniteLoop, 38)
False

>>> halts?(stops, 56)
True
```
Assume that you could!

def G(function, parameter):
    if halts?(function, parameter):
        while True:
            print "looping because it stops!"
    else:
        return "Returning because it loops!"
Assume that you could!

def G(function, parameter):
    if halts?(function, parameter):
        while True:
            print "looping because it stops!"
    else:
        return "Returning because it loops!"

>>> G(G, G)
What will happen?
A contradiction!

Therefore, our assumption is invalid:

The function `halts?` cannot be written.
Turing's Halting Problem