CSc 110, Autumn 2017

Lecture 18: While loops and File Input

Adapted from slides by Marty Stepp and Stuart Reges
Programming Question

• Write a program that simulates rolling two 6-sided dice until their combined result comes up as 7.

  2 + 4 = 6
  3 + 5 = 8
  5 + 6 = 11
  1 + 1 = 2
  4 + 3 = 7

You won after 5 tries!
Programming Question

• Write a program that plays an adding game.
  • Ask user to solve random adding problems with 2-5 numbers.
  • The user gets 1 point for a correct answer, 0 for incorrect.
  • The program stops after 3 incorrect answers.

4 + 10 + 3 + 10 = \underline{27}
9 + 2 = \underline{11}
8 + 6 + 7 + 9 = \underline{25}
Wrong! The answer was 30
5 + 9 = \underline{13}
Wrong! The answer was 14
4 + 9 + 9 = \underline{22}
3 + 1 + 7 + 2 = \underline{13}
4 + 2 + 10 + 9 + 7 = \underline{42}
Wrong! The answer was 32
You earned 4 total points
# Asks the user to do adding problems and scores them.
from random import *

def main():
    # play until user gets 3 wrong
    points = 0
    wrong = 0
    while wrong < 3:
        result = play()  # play one game
        if result == 0:
            wrong += 1
        else:
            points += 1

    print("You earned", points, "total points.")
# Builds one addition problem and presents it to the user.
# Returns 1 point if you get it right, 0 if wrong.
def play():
    # print the operands being added, and sum them
    operands = random.randint(2, 5)
    sum = random.randint(1, 10)
    print(sum, end='')
    for i in range(2, operands + 1):
        n = random.randint(1, 10)
        sum += n
        print(" +", n, end='')
    print(" = ", end='')
    # read user's guess and report whether it was correct
    guess = input()
    if guess == sum:
        return 1
    else:
        print("Wrong! The answer was", sum)
        return 0
File Input/output (I/O)

- **name** = `open("filename")`
  - opens the given file for reading, and returns a file object

- **name . read()**
  - file's entire contents as a string

```python
>>> f = open("hours.txt")
>>> f.read()
'123 Brett 12.5 8.1 7.6 3.2\n456 Sarina 4.0 11.6 6.5 2.7 12\n789 Nick 8.0 8.0 8.0 8.0 7.5\n'
```
File paths

• **absolute path**: specifies a drive or a top " / " folder
  
  C:/Documents/smith/hw6/input/data.csv
  
  • Windows can also use backslashes to separate folders.

• **relative path**: does not specify any top-level folder

  names.dat
  input/kinglear.txt

  • Assumed to be relative to the *current directory*:

  ```python
  file = open("data/readme.txt")
  ```

  If our program is in H:/hw6,
  open will look for H:/hw6/data/readme.txt
split

You can use the `split` function to break a file apart

- `str.split()` – splits a string on blank space
- `str.split(other_str)` – splits a string on occurrences of the other string

```python
>>> f = open("hours.txt")
>>> text = f.read()
'1\n2\n45\n6\n'

>>> f = text.split()
['1', '2', '45', '6']
```
Looping through a file

- The result of `split` can be used in a `for ... in loop`

- A template for reading files in Python:

```python
file = open("filename")
text = file.read()
text = text.split()
for line in text:
    statements
```
File input question

- We have a file `weather.txt`:
  16.2
  23.5
  19.1
  7.4
  22.8
  18.5
  -1.8
  14.9

- Write a program that prints the change in temperature between each pair of neighboring days.

  16.2 to 23.5, change = 7.3
  23.5 to 19.1, change = -4.4
  19.1 to 7.4, change = -11.7
  7.4 to 22.8, change = 15.4
  22.8 to 18.5, change = -4.3
  18.5 to -1.8, change = -20.3
  -1.8 to 14.9, change = 16.7
# Displays changes in temperature from data in an input file.

def main():
    input = open("weather.txt")
    lines = input.read().split()
    prev = float(lines[0])  # fencepost
    for i in range(1, len(lines)):
        next = float(lines[i])
        print(prev, "to", next, ", change =", (next - prev))
        prev = next
Gas prices question

• Write a program that reads a file gasprices.txt
  • Format: Belgium $/gal
    US $/gal
    date

  8.20
  3.81
  3/21/11
  8.08
  3.84
  3/28/11
  ...

• The program should print the average gas price over all data in the file for both countries:

  Belgium average: 8.3
  USA average: 3.9
def main():
    file = open("gasprices.txt")
    belgium = 0
    usa = 0
    count = 0
    lines = file.read().split()

    for i in range(0, len(lines), 3):
        belgium += float(lines[i])
        usa += float(lines[i + 1])

    print("Belgium average:", (belgium / count), "/gal")
    print("USA average:", (usa / count), "/gal")