

GRE Prime Number Project

Using The Python Programming Language

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10/2017

For the purposes of simultaneously studying prep material for the quantitative portion of the GRE while also becoming more adept in the programming language known as Python.

Objectives:

- Initiate a welcome “screen” where users can choose to start or end the program.
- Prompt the user for an integer.
- Use arithmetic code to determine if that integer is a prime number, if it is not, ask the user if they would like the prime factors.
- Determine and display the prime factors if applicable.
- Prompt the user if they would like to go again or end the program.

Code for the welcome “screen”:

```
prime1.py | primeWelcome.py | prime2.py
1 from sys import exit
2 import math
3 import prime1
4
5 #display welcome
6 print("""\n
7     *** Welcome To Prime Time! The Prime Number Calculator!!! ***
8         Developed by Nate Boyle 10/17 for the purpose
9         of learning Python code and preparing for
10        the quantitative portion of the GRE""")
11
12 #prompt user to begin or end program
13 print("""
14         Would you like to begin the program?""")
15 begin = input("""
16         Press s to start q to quit\n""")
17
18 if begin == "s":
19     prime1.enterInteger()
20 elif begin == "q":
21     exit()
22
```

Code for prompting user for numbers and program directions:

```
prime1.py      primeWelcome.py      prime2.py
1  from sys import exit
2  import math
3  import prime2
4
5  factorList = []
6
7  def enterInteger():
8
9
10     #prompt user for an integer
11     number = int(input("\nPlease enter an integer: "))
12
13     #display appropriate message regarding whether number is prime
14     if prime2.isPrime(number) == True:
15         print(number, " is a prime number.\n")
16     else:
17         print(number, " is not a prime number.\n")
18         #if not prime, ask user if they would like the prime factors
19         print("Would you like to find the prime factors?")
20         choice = input("Enter y for yes and n for no\n")
21         if choice == "y":
22             prime2.primeFactors(number)
23             print("\nThese are the absolute values of the prime factors:")
24             del factorList[:]
25         else:
26             pass
27
28
29
30     #prompt user to go again
31     print("\nWould you like to go again?")
32     response = input("Enter y for yes and n for no to leave the program.\n")
33
34     if response == "y":
35         enterInteger()
36     elif response == "n":
37         exit()
```

Code for determining whether the integer is prime and for retrieving prime factors:

```
prime1.py    primeWelcome.py    prime2.py
1  from sys import exit
2  import math
3  import prime1
4
5  #method to retrieve prime factors
6  def primeFactors(n):
7      num = abs(n)
8      for i in range (2, num):
9          if (num%i) == 0:
10             prime1.factorList.append(i)
11             if isPrime(num//i) == True:
12                 prime1.factorList.append(num//i)
13             else:
14                 primeFactors(num//i)
15             break
16
17 #method to determine if the integer is a prime number
18 def isPrime(n):
19     num = abs(n)
20     if num > 1:
21         for i in range (2, num):
22             if (num%i) == 0:
23                 return False
24             break
25         else:
26             return True
27     else:
28         return False
```

Sample run of the program showing both prime and non-prime numbers, and the retrieval of prime factors:

```
*** Welcome To Prime Time! The Prime Number Calculator!!! ***
    Developed by Nate Boyle 10/17 for the purpose
      of learning Python code and preparing for
        the quantitative portion of the GRE

      Would you like to begin the program?

          Press s to start q to quit

s

Please enter an integer: 123456789
123456789 is not a prime number.

Would you like to find the prime factors?
Enter y for yes and n for no
y

These are the absolute values of the prime factors: [3, 3, 3607, 3803]

Would you like to go again?
Enter y for yes and n for no to leave the program.
y

Please enter an integer: 3607
3607 is a prime number.

Would you like to go again?
Enter y for yes and n for no to leave the program.
y

Please enter an integer: 3803
3803 is a prime number.

Would you like to go again?
Enter y for yes and n for no to leave the program.
n
Nates-MacBook-Air:GREProject ncboyle$
```