The Definition of Prime Numbers Contradicts Its Very Own Existence

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Abstract

Prime numbers are quite intriguing, since these numbers are only evenly divisible by itself and 1, but it does not really explain how these numbers are created in the first place. Attempting to prove that prime numbers are not created by means of multiplication will require the creation of a simulated world, where the only algebraic operation available is multiplication.

This paper details some observable properties between composite and prime numbers when the only available arithmetic operation is multiplication. Section 2 details the parameters and condition used on the simulations. Section 3 provides proof that no new prime numbers can be created by means of multiplication.

Section 4 provides proof that odd composite numbers cannot exist without odd prime numbers, whereas section 5 proves that some even numbers are a multiple of at least one odd prime number. Section 6 details how the definition of prime numbers contradicts its very own existence, while section 7 provides proof that composite numbers are not directly linked to prime numbers.

1. Introduction

What is currently known about prime numbers are as follows:

a. 1 is not a prime number
b. 2 is the only even prime number
c. A prime number is a positive whole number
d. A prime number is only evenly divisible by itself and 1
e. A prime number will never be evenly divided by any smaller number

2. Simulating the world of numbers using a computer algorithm

The world of numbers is quite fascinating, especially in a world where some problems can easily be solved or explained with the help of various algebraic operations. But sometimes, these very same capabilities can lead to confusion that makes the truth harder to notice, especially if the truth has been obscured for hundreds of years.

In order to determine the relation between prime and composite numbers, a world must be created to have no other mathematical capabilities except for the concept of multiplication. Simulating a specific world with its own specific rules is quite easy to do with the help of computer algorithms, which will allow the observance of all possible outcomes for any given scenario. Using the python language to construct a world with the following conditions. See python code in Appendix A.

Simulation conditions: Create a world where

a. The all_known_numbers list in the python code will only contain numbers that are going to be used in the simulation
b. New numbers can only be identified by means of multiplication
    - The world has the ability to multiply any number as long as the number has already been identified
    - The numbers inside the all_known_numbers list in the python code can be multiplied by itself and all other numbers that are in the list
    - Newly identified numbers will also be multiplied to all other existing numbers in the all_known_numbers list in the python code
c. Store all newly identified numbers in the same list
    - Sort the outputted list ascendingly to make it easier to read
d. The variable find_number_until in the python code limits newly discoverable numbers up to the number specified by this variable
    - This prevents positive numbers greater than 1 to multiply indefinitely inside the loop.
e. Stop the loop when there are no new numbers found after 3 loops

Simulation 1 records how many numbers the set will be able to create if given only numbers from 1 to 3. Simulation 2 observes how many numbers the set can create from 1 to 1,000,000 if the only given numbers are 1 and 2. Simulation 3 determines how many additional numbers the set can create if the numbers in the set were further increased to include numbers from 1 to 10.

Simulation 1

The world only knows three numbers and can only identify numbers from 1 to 100

```
all_known_numbers = [1, 2, 3]
find_number_until = 100

Executing the program resulted in:

all known numbers:
[1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 27, 32, 36, 48, 54, 64, 72, 81, 96]

total count of all known numbers: 20
Prime numbers are: [2, 3]
```

Populating the table with the result:

1	2	3	4		6		8	9	
	12				16		18		
			24			27			
	32				36				
							48		
			54						
			64						
	72								
81									
					96				

Given only numbers from 1 to 3, the simulation was able to create 17 out of 97 possible numbers. This means 80% of the numbers between 1 to 100 will never be identified by means of multiplication alone. It can also be observed that no new prime numbers were created aside from the prime numbers that were already included from the very beginning.

Simulation 2

Find all numbers from 1 to 1,000,000 with only 1 and 2 as known numbers

```
all_known_numbers = [1, 2]
find_number_until = 1,000,000

Executing the program resulted in:
```

```
all known numbers:
[1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 4096, 8192, 16384, 32768, 65536, 131072,
262144, 524288]

total count of all known numbers: 20
Prime numbers are: [2]
```

Even without a table, it can be clearly seen that 2 by itself can only create 18 other even numbers from 1 to 1,000,000. The result by itself can be used as proof that without additional odd numbers, other even numbers will simply not be able to exist.

Simulation 3

Knowing numbers from 1 to 10, find all numbers from 1 to 100

```
all_known_numbers = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]
find_number_until = 100

Executing the program resulted in:

all known numbers:
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21, 24, 25, 27, 28, 30, 32, 35, 36, 40, 42, 45,
48, 49, 50, 54, 56, 60, 63, 64, 70, 72, 75, 80, 81, 84, 90, 96, 98]

total count of all known numbers: 45
Prime numbers are: [3, 5, 7]
```

As can be seen from the results above, increasing the set to include numbers from 1 to 10 was still not enough to create even half of all possible numbers between 1 to 100. It can also be observed that not only are the odd prime numbers missing, but all of its multiples as well. This result can also be used as proof that not only will some odd numbers cease to exist without the existence of a particular odd prime number, but some even numbers as well.

Example:

Multiples of 11 and 13 doesn't exist

$11 \times 2 = 22$	$13 \times 2 = 26$
$11 \times 3 = 33$	$13 \times 3 = 39$
$11 \times 4 = 44$	$13 \times 4 = 52$
$11 \times 5 = 55$	$13 \times 5 = 65$
and so on …	*and so on …*

3. Prime numbers are not created through multiplication

As shown in simulation 1 with only three known numbers, the total count of numbers it was able to create was 17 out of 97 possible numbers. In simulation 3, the known numbers were further increased to include numbers from 1 to 10, but was still not enough to yield even half of all possible numbers between 1 to 100. Given all the facts from the samples collected, it is safe to infer that it is simply not possible to find any other odd prime number through multiplication between two numbers.

4. Odd composite numbers cannot exist without odd prime numbers

As shown in simulation 1, any multiples of 3 exist because 3 as a prime number was already known from the very beginning. But if there are no known odd prime number as shown in simulation 2, then there will never be any other new odd number even if the simulation was further increased to find numbers from 1 to 1,000,000,000. Therefore, it is safe to infer that for any given odd composite number, it must be a multiple of at least one odd prime number for it to exist.

5. Some even numbers are a multiple of at least one odd prime number

As shown in simulation 2, the number 2 by itself can only create 18 other even numbers out of a million possible numbers. Thus, some even numbers will never exist if the odd number required to multiply with 2 does not exist. Therefore, it is now safe to infer that since odd composite numbers cannot exist without odd prime numbers, then some even numbers are a multiple of at least one odd prime number.

6. The definition of prime numbers contradicts its very existence

Following the logic established by simulations 1 and 3, all prime numbers cannot and will not exist if and only if multiplication between two numbers is the only method for finding other prime numbers. Therefore, it is now safe to infer that the definition of prime numbers, where it is only evenly divisible by itself and 1 contradicts how prime numbers exist in the first place.

7. Composite numbers are not directly linked to prime numbers

Composite numbers are created by multiplying two or more smaller numbers, but if prime numbers are not created through multiplication, then it is safe to infer that composite numbers are not directly linked to prime numbers. Therefore, prime numbers should not be defined by the properties of composite numbers, since prime numbers cannot exist by means of multiplication between two numbers.

8. Conclusion

Prime and composite numbers have been intertwined for hundreds of years, but a closer look through the simulation proves that they are not directly linked to each other. Prime numbers are created by means other than multiplication, whereas composite numbers are created using multiplication alone. Therefore, a reason must exist to explain why composite numbers were mistakenly associated with prime numbers in the first place.

Based on all the facts gathered so far from the simulations, it can be safely inferred that:

a. For some even numbers to exist, a corresponding odd number must exist
b. For an odd composite number to exist, a corresponding odd prime number must exist
c. Some even numbers are a multiple of at least one odd prime number
d. All prime numbers cannot be identified through multiplication between two numbers
e. Composite numbers are not directly linked to prime numbers

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Appendix A:

Link to the GitHub repository containing the python code used in this research paper:

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https://github.com/07231985/primenumbers

```
# find all prime using only a limited number of numbers
# research paper: The Definition of Prime Numbers Contradicts
#                 Its Very Own Existence
# created by Glenn Patrick King Ang 10/20/2021

all_known_numbers = [1, 2, 3, ]
original_set_known_numbers = all_known_numbers.copy()
prime_numbers = []
find_number_until = 100
previous_count_known_numbers = 0
loop = 0

while loop < 5:
    for num_one in all_known_numbers:
        for num_two in all_known_numbers:

            product = num_one * num_two

            if product not in all_known_numbers and product <
find_number_until:
                all_known_numbers.append(product)
                loop = 0
    loop += 1

    if previous_count_known_numbers == len(all_known_numbers)
and loop > 3:
        break

    previous_count_known_numbers = len(all_known_numbers)

all_known_numbers.sort()
print(f"all_known_numbers = {original_set_known_numbers}")
print(f"find numbers until = {find_number_until}")
print(f"\nStarting the program:")
print(f"\nall known numbers: {all_known_numbers}")
print(f"\ntotal count of all known numbers:
{len(all_known_numbers)}")
```

```
for prime_candidate in all_known_numbers:
    is_prime = True

    if len(all_known_numbers) > 1:
        if prime_candidate % 2 == 0:
            pass
        else:
            for all_smaller_nums in
all_known_numbers[1:all_known_numbers.index(prime_candidate)]:
                if prime_candidate % all_smaller_nums == 0:
                    is_prime = False

            if is_prime:
                if prime_candidate != 1:
                    prime_numbers.append(prime_candidate)
        if prime_candidate == 2:
            prime_numbers.append(2)

print(f"Prime numbers are: {prime_numbers}")
```