# Prime Number Design

***Pseudocode:***

```
get_desired_number()
  GET number          #1
  RETURN number

do_calculation(  number  )
  FOR num ← 0 … number + 1        #2
    IF num > 1
      FOR j ← 2 … num          #3
        IF num % j = 0          #4
          BREAK
        ELSE:
          PUT num               #5

main()
  number ← get_desired_number()
  do_calculation(  number  )
```

***Calculated Efficiency:*** O(n^2), due to the two FOR loops that are iterating 1 by 1 it's measures out to be an O(n^2) algorithm.

***Trace:***

| | number | num | j | Output |
|---|---|---|---|---|
| 1 | 20 | Null | Null | |
| 2 | 20 | 0 | Null | |

| | | | | |
|---|---|---|---|---|
| 3 | 20 | 0 | Null | |
| 2 | 20 | 1 | null | |
| 3 | 20 | 1 | Null | |
| 2 | 20 | 2 | Null | |
| 3 | 20 | 2 | 2 | |
| 4 | 20 | 2 | 2 | |
| 5 | 20 | 2 | 2 | 2 |
| 2 | 20 | 3 | 0 | |
| 3 | 20 | 3 | 2 | |
| 5 | 20 | 3 | 2 | 3 |
| 2 | 20 | 4 | 2 | |
| 3 | 20 | 4 | 2 | |
| 4 | 20 | 4 | 2 | |
| 2 | 20 | 5 | 2 | |
| 3 | 20 | 5 | 2 | |
| 3 | 20 | 5 | 3 | |
| 3 | 20 | 5 | 4 | |
| 5 | 20 | 5 | 4 | 5 |
| 2 | 20 | 6 | 4 | |
| 4 | 20 | 6 | 2 | |
| 2 | 20 | 7 | 2 | |
| 3 | 20 | 7 | 2 | |
| 3 | 20 | 7 | 3 | |
| 3 | 20 | 7 | 4 | |
| 3 | 20 | 7 | 5 | |
| 3 | 20 | 7 | 6 | |
| 5 | 20 | 7 | 6 | 7 |
| 2 | 20 | 8 | 6 | |
| 3 | 20 | 8 | 2 | |
| 4 | 20 | 8 | 2 | |
| 2 | 20 | 9 | 2 | |
| 3 | 20 | 9 | 2 | |
| 3 | 20 | 9 | 3 | |
| 4 | 20 | 9 | 3 | |
| 2 | 20 | 10 | 3 | |
| 3 | 20 | 10 | 2 | |
| 4 | 20 | 10 | 2 | |
| 2 | 20 | 11 | 2 | |
| 3 | 20 | 11 | 2 | |
| 3 | 20 | 11 | 3 | |
| 3 | 20 | 11 | 4 | |
| 3 | 20 | 11 | 5 | |

| | | | | |
|---|---|---|---|---|
| 3 | 20 | 11 | 6 | |
| 3 | 20 | 11 | 7 | |
| 3 | 20 | 11 | 8 | |
| 3 | 20 | 11 | 9 | |
| 3 | 20 | 11 | 10 | |
| 5 | 20 | 11 | 10 | |
| 2 | 20 | 12 | 10 | |
| 3 | 20 | 12 | 2 | |
| 4 | 20 | 12 | 2 | |
| 2 | 20 | 13 | 2 | |
| 3 | 20 | 13 | 2 | |
| 3 | 20 | 13 | 3 | |
| 3 | 20 | 13 | 4 | |
| 3 | 20 | 13 | 5 | |
| 3 | 20 | 13 | 6 | |
| 3 | 20 | 13 | 7 | |
| 3 | 20 | 13 | 8 | |
| 3 | 20 | 13 | 9 | |
| 3 | 20 | 13 | 10 | |
| 3 | 20 | 13 | 11 | |
| 3 | 20 | 13 | 12 | |
| 5 | 20 | 13 | 12 | |
| 2 | 20 | 14 | 12 | |
| 3 | 20 | 14 | 2 | |
| 4 | 20 | 14 | 2 | |
| 2 | 20 | 15 | 2 | |
| 3 | 20 | 15 | 2 | |
| 3 | 20 | 15 | 3 | |
| 4 | 20 | 15 | 3 | |
| 3 | 20 | 16 | 3 | |
| 2 | 20 | 16 | 2 | |
| 3 | 20 | 16 | 2 | |
| 4 | 20 | 16 | 2 | |
| 2 | 20 | 17 | 2 | |
| 3 | 20 | 17 | 2 | |
| 3 | 20 | 17 | 3 | |
| 3 | 20 | 17 | 4 | |
| 3 | 20 | 17 | 5 | |
| 3 | 20 | 17 | 6 | |
| 3 | 20 | 17 | 7 | |
| 3 | 20 | 17 | 8 | |
| 3 | 20 | 17 | 9 | |

| | | | | |
|---|---|---|---|---|
| 3 | 20 | 17 | 10 | |
| 3 | 20 | 17 | 11 | |
| 3 | 20 | 17 | 12 | |
| 3 | 20 | 17 | 13 | |
| 3 | 20 | 17 | 14 | |
| 3 | 20 | 17 | 15 | |
| 3 | 20 | 17 | 16 | |
| 5 | 20 | 17 | 16 | |
| 2 | 20 | 18 | 16 | |
| 3 | 20 | 18 | 2 | |
| 4 | 20 | 18 | 2 | |
| 2 | 20 | 19 | 2 | |
| 3 | 20 | 19 | 2 | |
| 3 | 20 | 19 | 3 | |
| 3 | 20 | 19 | 4 | |
| 3 | 20 | 19 | 5 | |
| 3 | 20 | 19 | 6 | |
| 3 | 20 | 19 | 7 | |
| 3 | 20 | 19 | 8 | |
| 3 | 20 | 19 | 9 | |
| 3 | 20 | 19 | 10 | |
| 3 | 20 | 19 | 11 | |
| 3 | 20 | 19 | 12 | |
| 3 | 20 | 19 | 13 | |
| 3 | 20 | 19 | 14 | |
| 3 | 20 | 19 | 15 | |
| 3 | 20 | 19 | 16 | |
| 3 | 20 | 19 | 17 | |
| 3 | 20 | 19 | 18 | |
| 3 | 20 | 19 | 18 | 19 |
| 3 | 20 | 20 | 18 | |
| 3 | 20 | 20 | 2 | |
| 5 | 20 | 20 | 2 | |