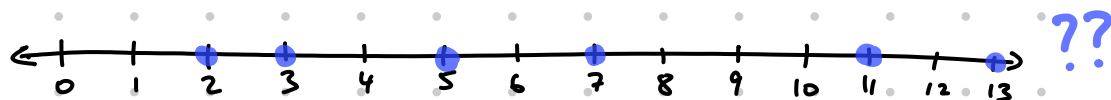


How are the primes distributed?



Given any positive number x , how many primes are less than or equal to x ?

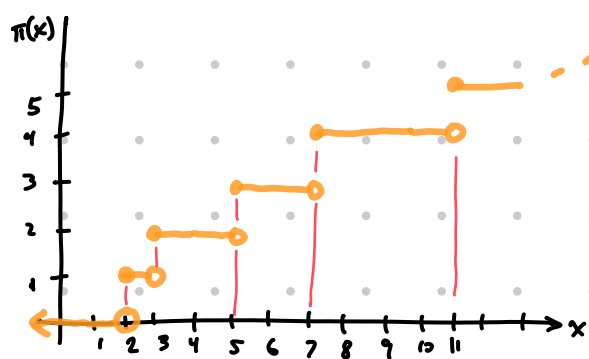
Define: The prime counting function $\pi(x)$ gives the number of primes less than or equal to x .

$$\pi(x): \mathbb{R} \rightarrow \mathbb{Z}^{\geq 0}$$

↖ non-negative integer

examples: $\pi(1) = 0$ $\pi(12.3) = 5$
 $\pi(10) = 4$ $\pi(100) = 25$

Want to make a plot of $\pi(x)$:



What is the shape of the prime-counting function?

Efficiently compute $\pi(x)$ for $x=1, 2, 3, 4, \dots, nMax$

primes = $[2, 3, 5, 7, 11, 13, 17, 19, \dots, ?]$

index $i = 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, \dots, nMax-1$

counts = $[0, 0, 1, 2, 2, 3, 0, 0, 0, 0, 0, \dots, 0]$

want: $\pi(4)$ $\pi(7)$ $\pi(10)$

loop: i from 2 to $nMax$:
if i is the next prime:
add 1 to count
store count in counts[i]