Algorithm to loop through and return set of prime nums

Return

Let $n \in \mathbb{Z}^+$ and let $n \leq 10,000$ (1)
Create Set S (2)
for i = 1 to n :
    if i = 2 or 3 or 5 or 7 or i%2 and 3 and 5 and 7 != 0 (3)
        S add i
return S

This works because we take care of all base cases 2, 3, 5, 7, and then anything divisible by either of them,

Runtime estimate: O(n) - for loop through each until n.