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CSCI 264-01
Homework 0

HW0 Problem 1 Writeup

a) Verbal Description

Given a number n, this algorithm will iterate through every number from 1 to n-1 and prints the iteration to the screen, on its own line, if it is prime.

b) Pseudocode

```
Given an input n
For every number i from 1 to n-1:
      If i is prime:
            Print i

To check that i is prime, need another algorithm:
For every number k from 2 to i/2:
      If i%k == 0:
            Return true
Return false
```

c) Proof of Correctness

This algorithm will always be correct because it will always check every integer less than n. Thus, it will always print every prime number less than n.

d) Running Time Estimate

$O(n^2)$

e) Running Time Estimate Reasoning

Each part of the algorithm separately has a time complexity of O(n). When combined, the algorithm needs to run a loop up to i/2 times for every i less than n, making it exponential.