§5.9: Sieve of Eratosthenes (example)

- *devo*

13 Oct 2005
CMPT14x
Dr. Sean Ho
Trinity Western University

Reminders:

1) journals in folder

TRINITY WESTERN UNIVERSITY

http://cmpt14x.seanho.com/

Review of (5.4-5.8)

- FOR loops
  - Loop control variable
    - Needs initialization?
    - Value after the loop?
  - FOR vs. WHILE: pros/cons?
- Arrays as procedure parameters
  - Type compatibility for value/variable params
  - Open arrays
    - HIGH
- Multidimensional arrays

What's on for today (5.9)

- An example of using arrays:
  - Sieve of Eratosthenes

Problem statement: list primes

- Problem: list all the prime numbers between 2 and some given big number.
  - You had a homework that was similar: test if a given number is prime, and list its factors
  - How did you solve that?
    - Procedure IsPrime (pseudocode):

```
Iterate for factor being 2 .. sqrt(n):
    If (n MOD factor is zero), then
        We've found a factor!
```

- But this is wasteful: really only need to test prime numbers for potential factors

Listing all primes

- We could tackle this problem by repeatedly calling IsPrime() on every number in turn:

```
FOR num := 2 TO max
    DO
        IF IsPrime(num) ...
```

- But this could be really slow if max is big

Sieve of Eratosthenes

- The sieve works by a process of elimination: we eliminate all the non-primes by turn:

Pseudocode:

- (pseudocode)

TODO items

- Lab5 due next week:
  - §6.11 #(25 / 33) (choose one)
- Homework: §5.11 #22 due tomorrow
- Quiz ch5 tomorrow!
- Reading: through §6.3 for tomorrow