

INTRO TO ASSIGNMENT ONE

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A Quick Intro to A0

- You'll be implementing prime factorization
- Need to write two separate methods
 - First uses “Sieve of Eratosthenes” to compute an array containing all primes $\leq n$
 - Second uses the array of primes to do prime factorization of a number $\leq n^2$
- How does “Sieve of Eratosthenes” work?
 - Start with array containing 2 through n
 - [2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24]

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 - First uses “Sieve of Eratosthenes” to compute an array containing all primes $< n$
 - Second uses the array of primes to do prime factorization of a number
- How does “Sieve of Eratosthenes” work?
 - Have a cursor; number under cursor (and everything to left) is prime
 - [2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24]

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 - Second uses the array of primes to do prime factorization of a number
- How does “Sieve of Eratosthenes” work?
 - Pass thru array; kill everything (by sliding?) that is a power of num under cursor
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 - [2, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, -, -, -, -, -, -, -, -, -, -]

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 - Second uses the array of primes to do prime factorization of a number
- How does “Sieve of Eratosthenes” work?
 - Then move the cursor along
 - [2, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, -, -, -, -, -, -, -, -, -, -]

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- How does “Sieve of Eratosthenes” work?
 - Kill everything to right of cursor that's a multiple
 - [2, **3**, 5, 7, 9, 11, 13, ~~15~~, 17, 19, ~~21~~, 23, -, -, -, -, -, -, -, -, -, -]

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 - Once number under cursor gets to \sqrt{n} you are done!
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- Second thing: use this array to “pretty print” prime factorization

A Primer on Printing

- Java has something called a “PrintStream” that allows character output
- `System.out`, `System.err` are both objects of type `PrintStream`

A Primer on Printing

- Two major PrintStream methods... one is “println”

```
// Prints "This is my string." followed by return  
System.out.println ("This is my string.");
```

```
// Prints "This is my number: " followed by i and return  
int i = 12;  
System.out.println ("This is my number: " + 12);
```

```
// Can append as much as you want  
double j = 12.6;  
System.out.println ("My numbers are " + i + " and " + j);
```

A Primer on Printing

- Two major PrintStream methods... the other is “format”

```
// Prints "This is my string." with no return
System.out.format ("This is my string.");
// Prints "This is my string." followed by return
System.out.format ("This is my string.\n");
// Prints "This is my num: 27." with no return
System.out.format ("This is my num: %d.", 27);
// Prints "This is my num: 27." with no return
int i = 27;
System.out.format ("This is my num: %d.", i);
// Prints "My nums are 27 and 29." with a return
int i = 27, j = 29;
System.out.format ("My nums are %d and %d.\n", i, j);
```