

Points: 70 (for showing that you really thought about the problem)

## Generating Prime Numbers

NOTE: Due Monday!

### PART 1

Think about how to generate prime numbers. Primes are integers greater than 1 that are divisible only by themselves and 1. For example here are the first 100:

```
2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71 73 79 83 89 97 101 103
107 109 113 127 131 137 139 149 151 157 163 167 173 179 181 191 193 197 199 211
223 227 229 233 239 241 251 257 263 269 271 277 281 283 293 307 311 313 317 331
337 347 349 353 359 367 373 379 383 389 397 401 409 419 421 431 433 439 443 449
457 461 463 467 479 487 491 499 503 509 521 523 541
```

15 is not in the list because, besides being divisible by 1 and 15, it is also divisible by 3 and 5.

Do not consult any texts (on the web or otherwise) about how to do this. Figure out a way on your own. There are plenty of unsolved problems for which there are no existing algorithms. We are pretending this is one. Test your ideas on a piece of paper, calculator, whiteboard, a walk on the beach, while singing in the shower, while riding a horse, ...

Do not read any further until you have thought about this. Use your imagination. Be inventive. Don't talk to anybody about how to do this until you have tried it and are ready to bring an idea (any idea) to the conversation. Then feel free to talk to others but don't let them solve this for you.

## PART 2

I, the user, would like to give you a number that tells you how many primes to print.

How will you get that number? What does that even mean?

How does this change your view of what you are going to do?

I, the user, would like a single column of numbers. That is all I have told you.

## PART 3

I, the user, would like to run this algorithm on a computer. This means we'll have to think about not only how I want to "do" the prime number generation, but what things (data) I want to have and how it changes over time. I have to think about both the process and the data and how the process changes the data. For most common computer languages that we might use, this means variables maybe even arrays or vectors of variables.

What does your algorithm need to remember from step to step in the process?

Formalize your algorithm for prime number generation using variables.

## PART 4

Try to write your algorithm in Python. What problems have you run into? What output are you generating? Is the output in the right format? How do you know?

## PART 5

Does your algorithm work? What does that mean? Is the user involved in answering that question?

## SUBMISSION

Submit your code **for review in front of the class**. You need to participate to get points. Do not put anything in your code you don't want others to see. We are all friends here, but there are things we really don't want to know. :-) Your code doesn't have to work, you just need to really try. Don't blow this off. Experience it.

Be a good scientist and take lab notes on your experience. I will want you to turn in your notes on finals week with your experiences. I will issue a grade for your notes.

(Creepy book recommendation of the week: "Annihilation" by Jeff Vandermeer. It involves field work and lab notebooks. :-) )

Have fun!