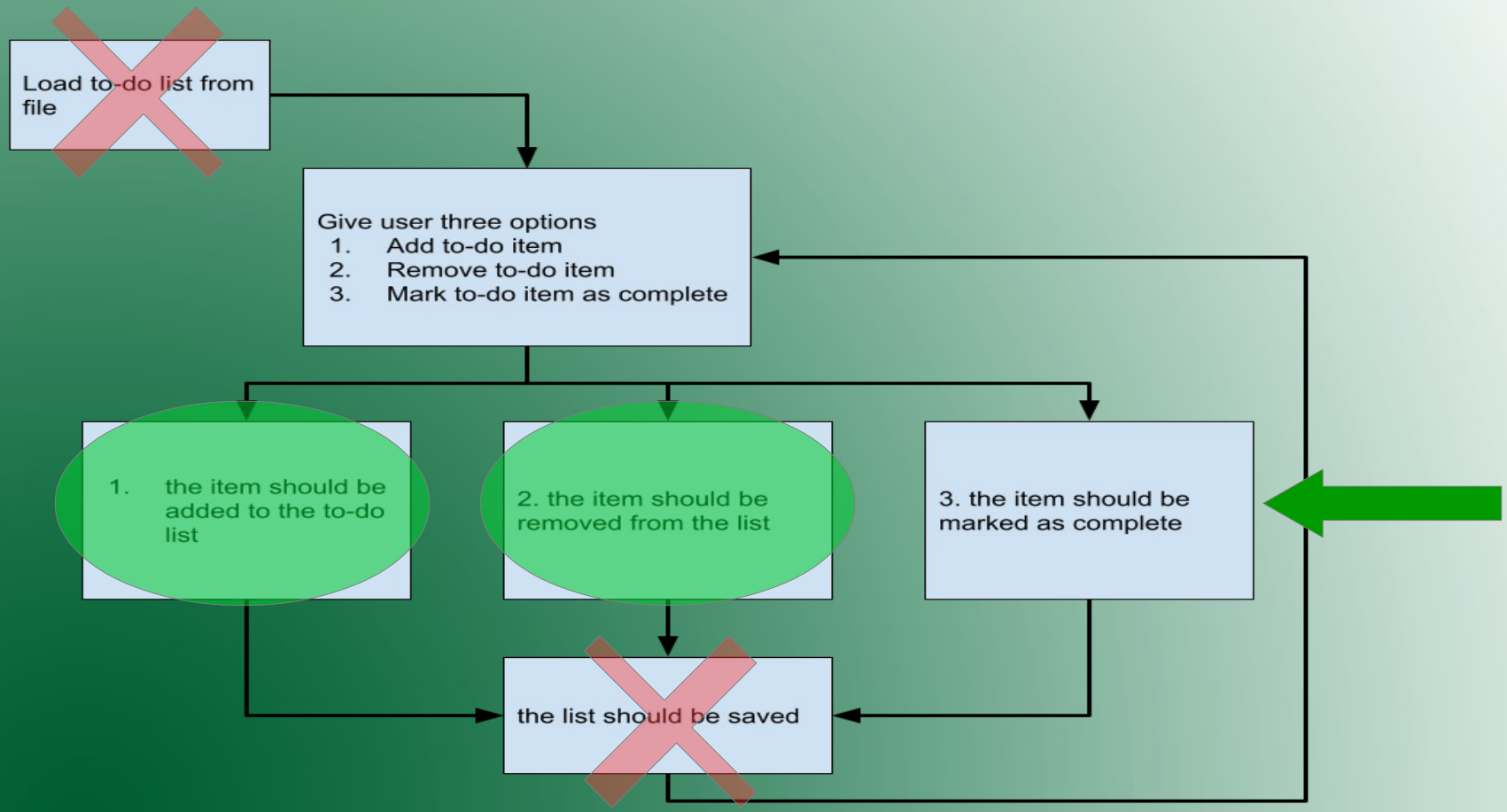
Python Class 13

Finish to-do class,
Start DNA project

How it should work



Get the code

- https://github.com/davidcbhunter/POP2021
- Copy the code here → todolist.py

While-loops and for-loops

- For-loops repeat an exact, determined (既定) number of times
- While-loops can repeat forever, or they can stop when a condition is met (具合/ 前提)

DNA and RNA

- Why DNA/RNA?
  - All living things have DNA.
  - Even viruses, like covid-19, use DNA or RNA to store their genetic information(遺伝子情報).

The Goal

- Make a DNA class with a list of genes (遺伝子)
- Make 3 different DNA instances
  - Influenza has 8 genes
  - MERS has 11 genes
  - Covid-19 has 9 genes
- Let's compare them!

Human genes

- How many genes do you have?

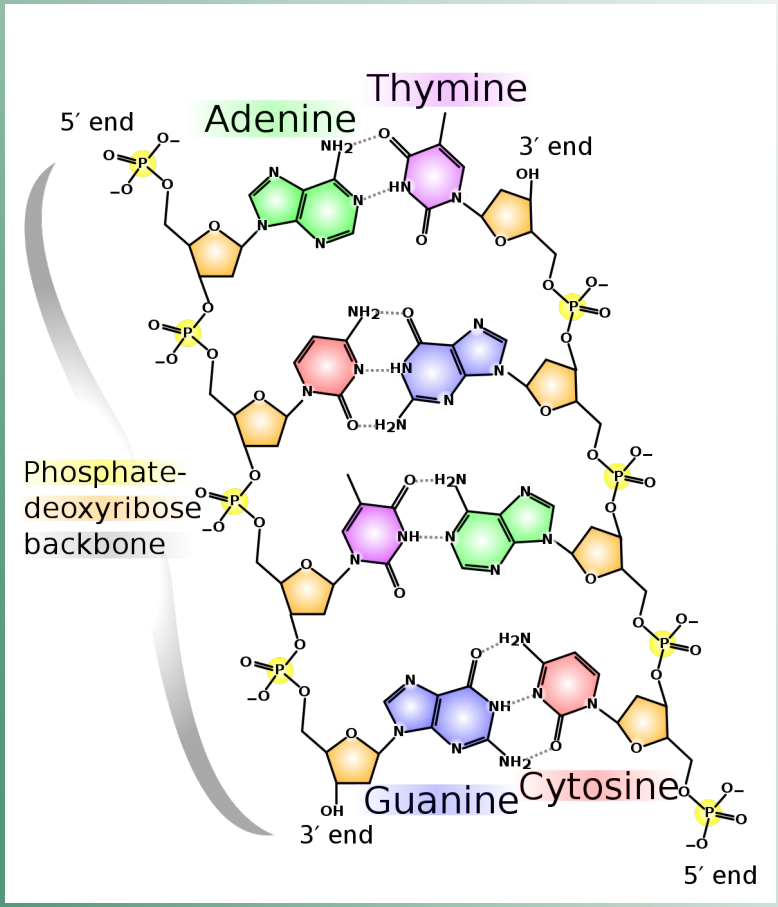
Human genes

- Humans probably have about 20,000 – 25,000 genes.
- We still don't know exactly how many.
- We don't know exactly what all the genes do.
- Most genes have MANY effects and influences.

DNA Information

- DNA controls genes (遺伝子).
- Genes create different proteins (酵素 / タンパク質).

DNA Information 2

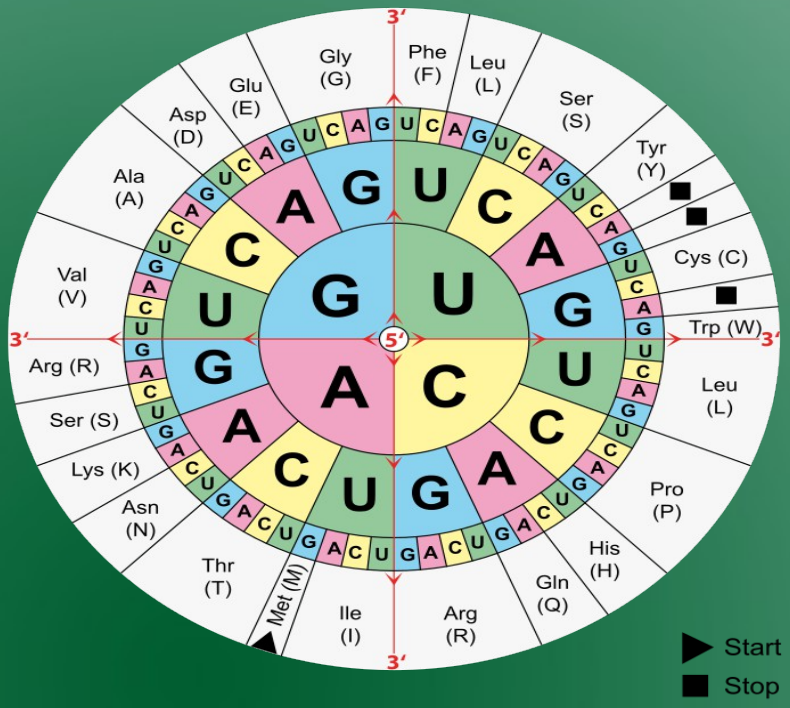


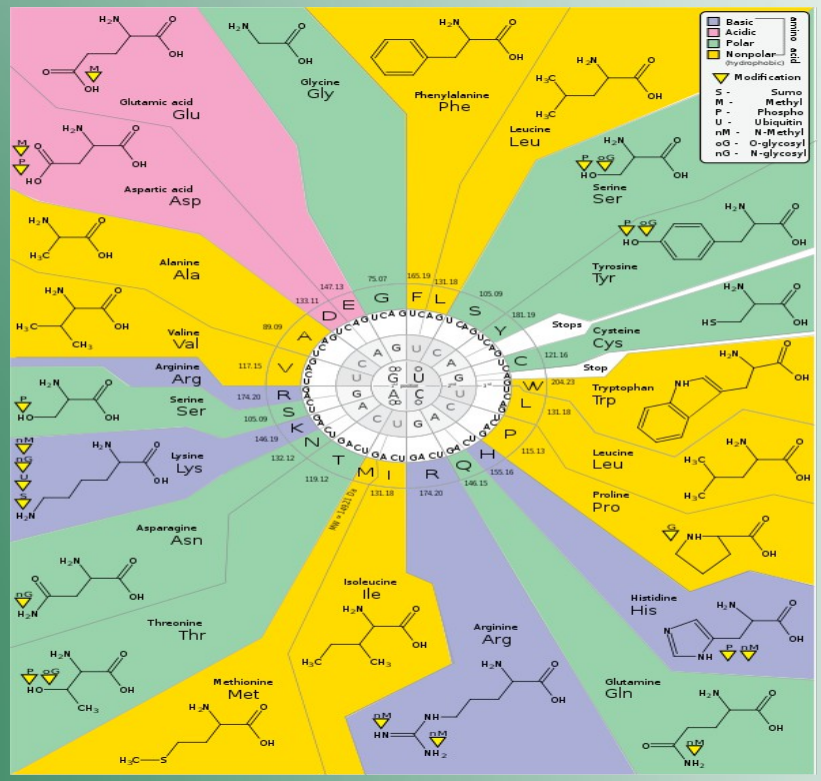
DNA Information 3

- DNA has different chemicals in groups of three.
- These chemicals are
  - Adenine
  - Thymine (T is changed to Uracil in RNA)
  - Guanine
  - Cytosine

DNA, 4

- Each group of three chemicals creates a part of a protein.





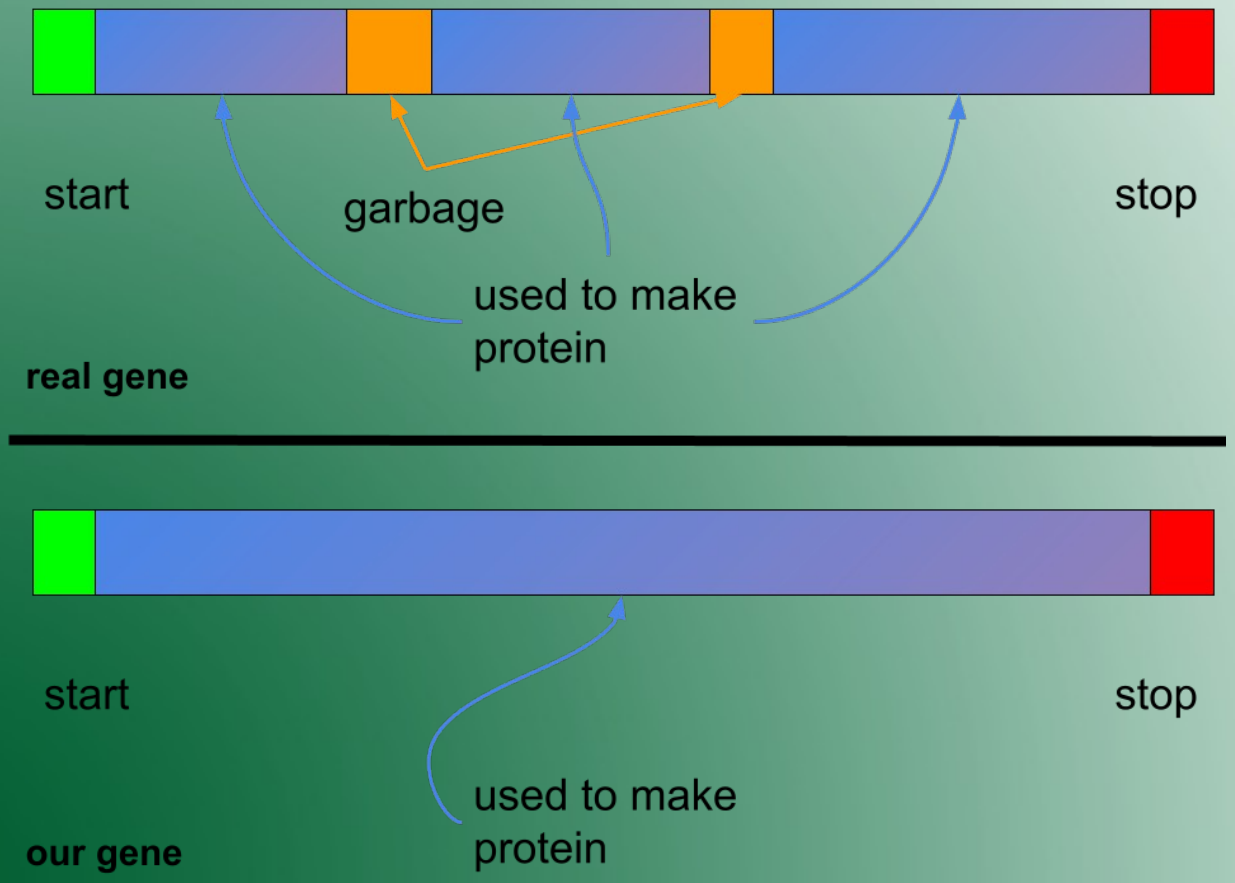
DNA 5

- Every gene starts with a special group of three
  - ATG (Adenine Thymine Guanine)
- There are three ways to stop a gene
  - TAG (Thymine Adenine Guanine)
  - TGA (Thymine Guanine Adenine)
  - TAA (Thymine Adenine Adenine)

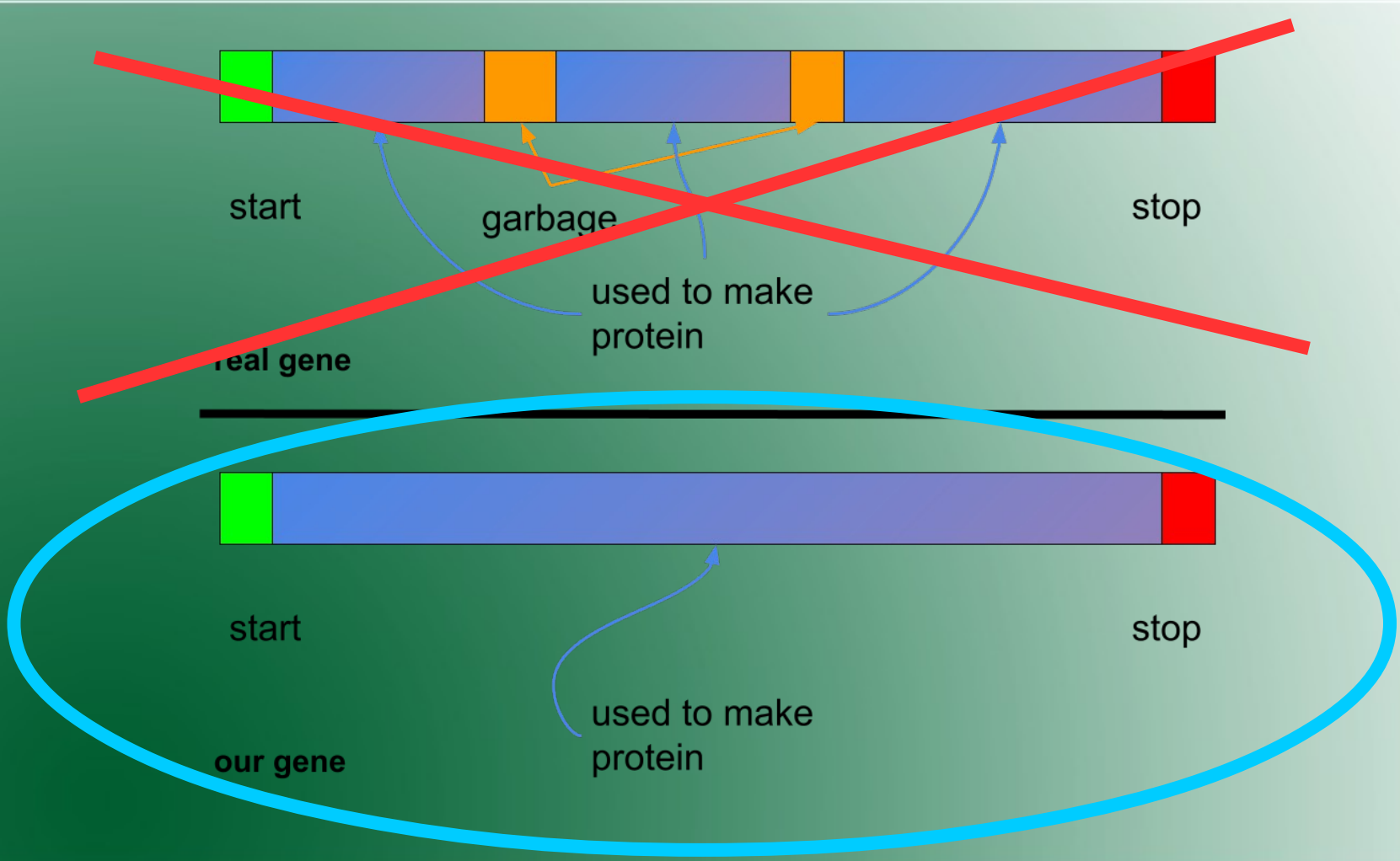
Human Gene length

- Human genes come in many different sizes.
- The longest is around 2,220,000 (That's the number of A's,T's,C's and G's).
- The shortest is around 700.

Gene Structure



Gene Structure

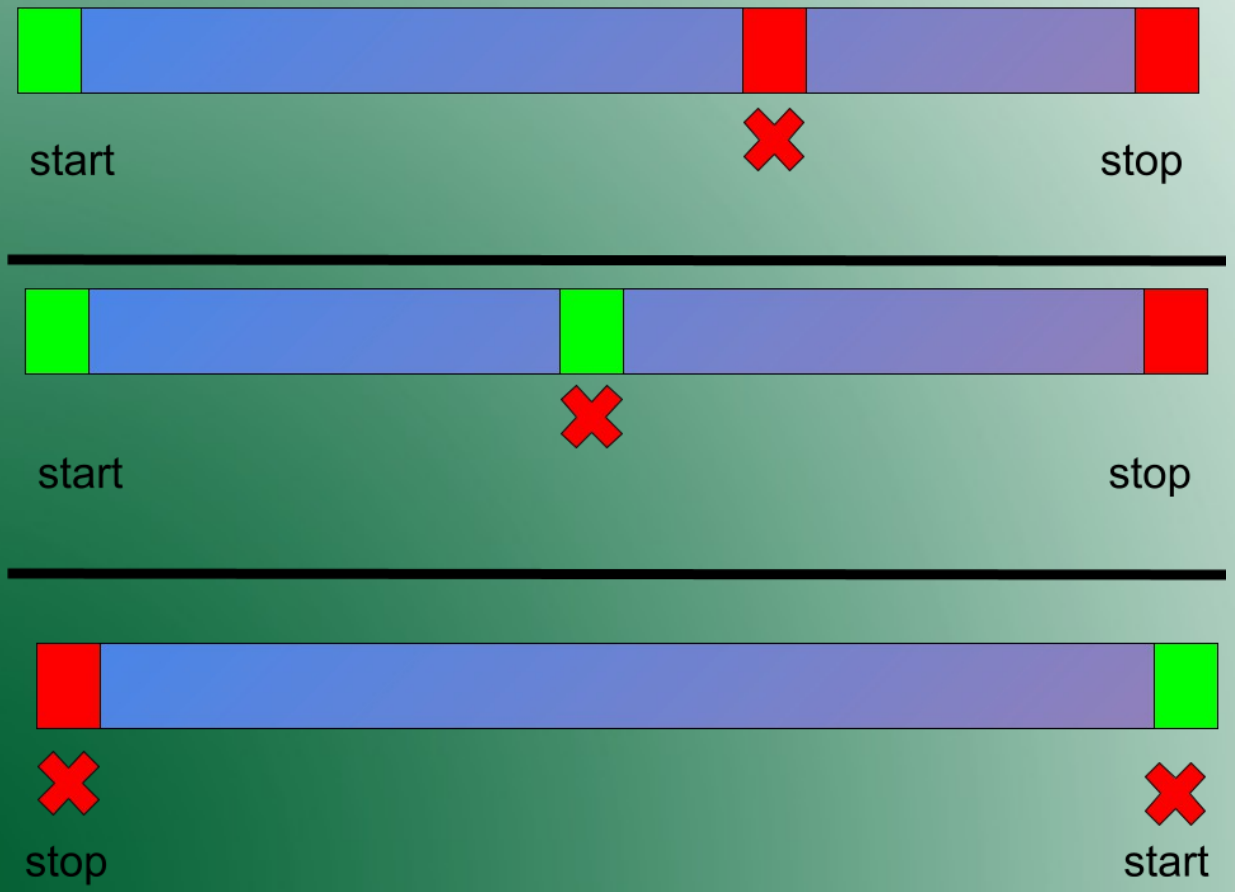


DNA exercise as list

- Let's write some code to make a random gene!

```
import random
#we will use random.randint(a,b)
chemicals = [“A”, “T”, “C” , “G”]
start = “ATG”
end = [“TAG”, “TGA” , “TAA”]
```

Rule for making codons



Let's change our code to a gene class

- What variables will it need?
- What functions will our gene class need?