Motivation

- We need a way to say "how fast" or "how slow" something is
- Timing something isn't super useful because runtime can have random variation from run to run, and can vary by input
- Function runtimes vary with their inputs:

```
def myFunction(n):
    total = 0
    for i in range(n):
        total += i
    return total
```

Runtime as a function of input size

- Solution: use the size of the input as a way to describe the function runtime
- Previous example runs in time directly/linear proportional to the input size, so we say it runs "like n" (where n is the size of the input)
- An example that runs like n^2:

```
def sumCombinationProducts(n):
    for i in range(n):
        for j in range(n):
            total += i * j
    return total
```