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| **Common Runtimes**  Before we delve into the multiple runtime cases, let’s see the different common runtimes a program could have. Below is a list of common runtimes that run from fastest to slowest.   * **Θ(1)**. This is *constant* runtime. This is the runtime when a program will always do the same thing regardless of the input. For instance, a program that only prints “hello, world” runs in Θ(1) because the program will always just print “hello, world”. * **Θ(log N)**. This is *logarithmic* runtime. You will see this runtime in search algorithms. * **Θ(N)**. This is *linear* runtime. You will often see this when you have to iterate through an entire dataset. * **Θ(N\*logN)**. You will see this runtime in sorting algorithms. * **Θ(N2)**. This is an example of a *polynomial* runtime. When **N** is raised to the **2nd** power, it’s known as a *quadratic* runtime. You will see this runtime when you have to search through a two-dimensional dataset (like a matrix) or nested loops. * **Θ(2N)**. This is *exponential* runtime. You will often see this runtime in recursive algorithms (Don’t worry if you don’t know what that is yet!). * **Θ(N!)**. This is *factorial* runtime. You will often see this runtime when you have to generate all of the different permutations of something. For instance, a program that generates all the different ways to order the letters “abcd” would run in this runtime. |
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