

1. (5 points) Give an example of an application that uses a proprietary algorithm (i.e. Spotify's "Discover Weekly" playlist, Google's PageRank algorithm, etc.). Find an article that discusses this algorithm and give a summary of its content. Provide at least 4-5 sentences for full credit.

Response: Zillow's Zestimate. As a former Realtor, I was always fascinated by the website, Zillow, and their method of providing free, no-hassle valuations of homes to anyone interested. One article I found discussing this algorithm is titled "*Zillow aims to provide instant valuations of homes; *Zillow claims to cure real estate info problem.*" by Mark Gibbs. Gibbs writes "After you enter the address of a house, Zillow applies an algorithm that uses what its statisticians call 'a proprietary algorithm' -big words for 'secret formula.' The result is what Zillow whimsically calls a 'Zestimate'."

If you're solving a series of subproblems, you would demarcate them like this:

2. (15 points) Consider two algorithms that perform the same function, that run in $n/4$ and $\log_2(n)$, respectively, where $n \in \mathbb{N}$ (i.e. natural numbers). n represents the input size and $n/4$ and $\log_2(n)$ represent runtimes with respect to the input size.

And your solution.

3. The second subproblem

And its solution. If you need to do some math, try using the `align` environment, like this:

$$\begin{aligned} T(n) &= n + c \\ &= \Theta(n) \end{aligned} \quad , \quad (1)$$

although there are other ways to display math, including inline like this $T(n) = \Theta(n)$.

And, here is a page break so that the next problem begins on a fresh page.

4. *Here is another problem.*

And another solution. If you need to write pseudocode, use the `verbatim` environment:

```
collatz(n) {  
    if n<1 { return 'Try a natural number n>0' }  
    if n==1 { return 'YES!' }  
    if isodd(n) {  
        collatz(3n+1)  
    } else {  
        collatz(n/2)  
    }  
}
```

in which exactly what you write is displayed, including whitespace.