

CSE 373: Section 2

Dictionaries and Algorithm Analysis

October 5th, 2017

Big O notation

For each of the following, show that $f(n) \in O(g(n))$

1. $f(n) = 3n$ $g(n) = 5n^2$

2. $f(n) = 17$ $g(n) = 32n + n * \log(n)$

3. $f(n) = 121n^3$ $g(n) = 11n^3$

Asymptotic Analysis

For the following methods, determine asymptotic runtime in terms of n

```
1. void method1(int n, int sum){
    for(int i = 0; i<n*100;i++){
        for(int j = n; j > 0; j--){
            sum++;
        }
        for(int k = 0; k<i; k++){
            sum++;
        }
    }
}
```

```
2. void method2(int n, int sum){
    int j = n;
    while (j>2){
        sum++;
        j = j/2;
    }
}
```

Comparing runtimes

Order the following functions from fastest to slowest in terms of asymptotic runtime. If there are multiple in the same bigO family, indicate this.

- $n * (n^2 * \log(n) + n)$
- n^2
- $10000n^3$
- $2^n + 3$
- $n^{\frac{1}{2}} + n + 128$
- $n + \log(n) + \frac{n}{5}$

Dictionaries

Provide pseudocode for inserting into a sorted array. What are the best and worst case runtimes for the method you proposed?