

Project 4: Dynamic Programming

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Pseudocode:

```
for (size_t i = 1; i < A.size(); ++i) {  
    if (A[i-1] > A[i] ) return false;  
}
```

O(n)

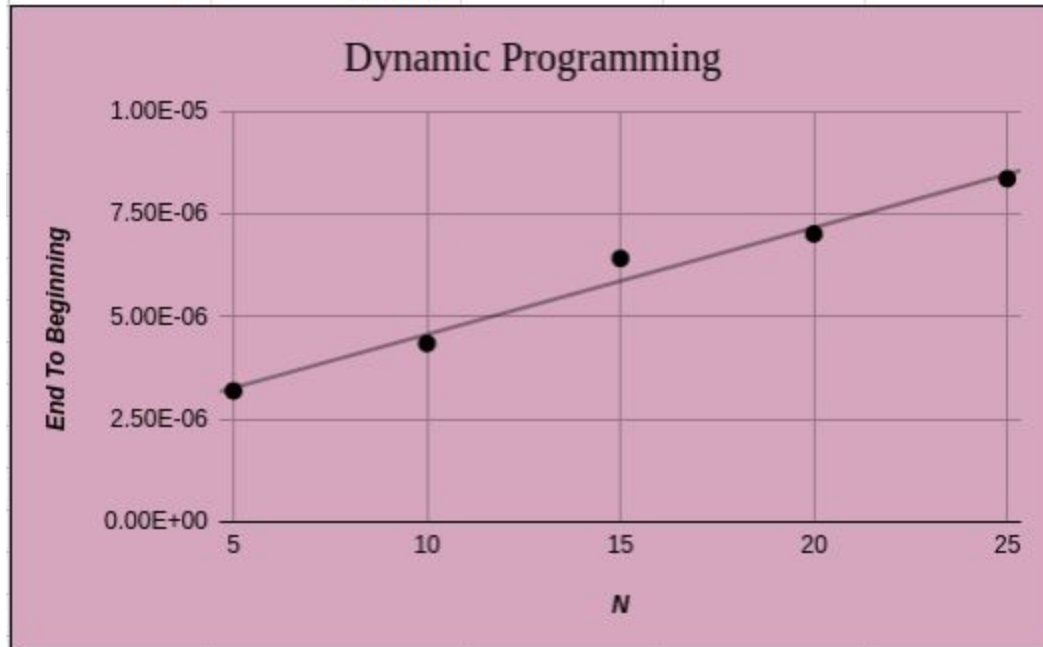
```
std::vector<size_t> H(n, 0);  
for (signed int i = n-2; i >= 0; i--) {  
    for (size_t j = i+1; j < n; j++) {  
        if (A[i] < A[j] && H[j] >= H[i] ){  
            H[i] = H[j] + 1;  
        }  
    }  
}
```

```
std::vector<int> R(max);  
size_t index = max-1, j = 0;  
for (size_t i = 0; i < n; ++i) {  
    if (H[i] == index) {  
        if (H[i] == index) {  
            R[j] = A[i];  
            index--;  
            j++;  
        }  
    }  
}
```

```
return sequence(R.begin(), R.begin() + max);  
}
```

O(n²)

N	End to Beginning			
5	3.19E-06			
10	4.35E-06			
15	6.43E-06			
20	7.03E-06			
25	8.38E-06			



Is there a noticeable difference in the running speed of the algorithm as compared to the powerset algorithm in Project 4? Which is faster, and by how much? Does this surprise you?

There is a slight noticeable difference between the run time of the two algorithms. I would say that based on the calculations it would seem that the powerset algorithm is a lot faster by slightly a couple of seconds.

Are the fit lines on your scatter plots consistent with this efficiency class? Justify your answer.

No, the scatter plot does match with the efficiency classes that are provided, we would see a higher increase in the time due to it beginning $O(n^2)$.

Is this evidence consistent or inconsistent with the hypothesis stated on the first page? Justify your answer.

For the first hypothesis stated on the first page it is consistent however for the second hypothesis stated, it is inconsistent due to the data gathered.