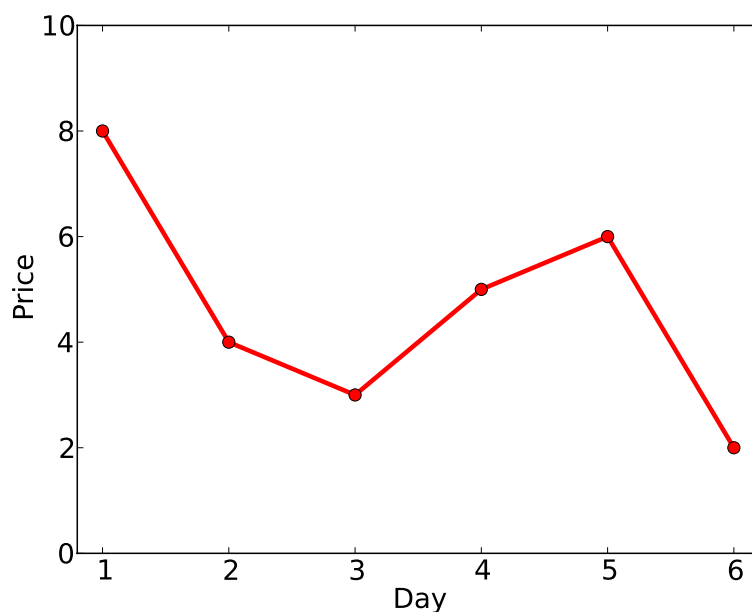# Final Examination Example

1 Problem in Assignment

In stock market, HH-index (historically highest) of the current price is k means that current price is the highest price in the previous k days, but not the highest one in the previous $k + 1$ days.

For example, the price changes as showed in the following figure.

The price in Day 5 is the highest in Days $5, 4, 3, 2$, but not highest one in Days $5, 4, 3, 2, 1$, thus $HH(5) = 4$;

The price in Day 4 is the highest in Days $4, 3, 2$, but not highest one in Days $4, 3, 2, 1$, thus $HH(4) = 3$;

The price in Day 3 is the highest in Day 3, but not highest one in Days $3, 2$, thus $HH(3) = 1$;

The input in this example is $8, 4, 3, 5, 6, 2$, the answer is $1, 1, 1, 3, 4, 1$. Given the prices of n days, please give an algorithm of $O(n)$ time complexity to calculate the HH$-$index of all days.

2 Problem in Examination

There are n cows standing in a line, and the cows have **distinct** heights. Suppose that each cow can see all cows in front of her till a cow taller than her.

Given the heights of n cows, please design an algorithm of $O(n)$ time complexity to calculate the number of cows that each cow can see.

For example, if the heights of cows are 4, 7, 8, 6, 3, 9, then the cow of height 4 can see **NO** cows (because she cannot see herself), the cow of height 3 can see **NO** cows, the cow of height 8 can see **2** cows. In conclusion, the cows can see 0, 1, 2, 0, 0, 5 cows in the front, respectively.