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Answer 1

Let's start with calculating N:

$$N \geq 0.25(\frac{z_{0.01}}{\triangle})^2$$

$$z_{0.01} = q_{0.99} = \phi^{-1}(0.99) = 2.325 \qquad \triangle = 0.03$$

$$N \geq 0.25(\frac{2.325}{0.03})^2 = 1501.56$$

That means we can use N as 1502.

Afer this calculation, we can write the code with random number generators. We have a loop that iterates N times. Every lime we are generating numbers and keeping them in an array to compute std and mean later. Also every time we are checking that total weight is bigger than 300,000 tons or not and keeping it in count to compute probability later. Here are the 4 different results for code:

```
Estimated probability : 0.174434
Expected weight: 268400.441817
Standard deviation : 33749.996871
>> hw4

Estimated probability : 0.165779
Expected weight: 268669.550237
Standard deviation : 33009.721452
>> hw4

Estimated probability : 0.175100
Expected weight: 269187.222508
Standard deviation : 33259.454455
>> hw4

Estimated probability : 0.175766
Expected weight: 268268.745106
Standard deviation : 33940.142596
```

When N goes to infinity the standart deviation goes to 0, so if we iterate with bigger N, the std will be lower, and the results will be more accurate. Our N is the smallest number that guarantees the 0.03 margin.