Counting

Ngày 27 tháng 10 năm 2011

What do we count?

What do we count?

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Question

Why do we count?

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To answer these questions we shall start practicing counting using common sense.

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A list of counting problems can be found in the file letsCount.pdf.

Làm thế nào nhiều trứng được vận chuyển trên các xe gắn máy trong ảnh?



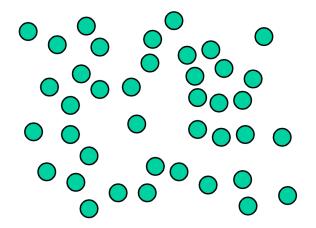
Counting

How many students are attending this class?

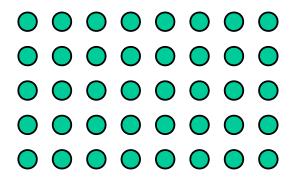


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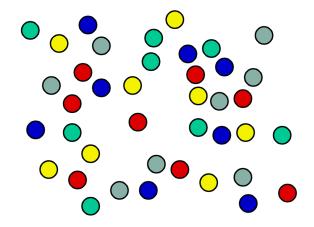
How many green disks are in this picture?



Can you count now?



And how about now?



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- If a collection can be "organized" (physically or conceptually, for example the "green" rectangular array) it can help us count the number of objects in the collection.
- If the collection can be partitioned into "smaller" collections, in particular if every smaller collection has the same number of objects, it may again help us count.

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I need to find the largest segment in the array.

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This problem looks very simple to answer:

Generate all segments.

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- Generate all segments.
- Calculate the weight of each segment.

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- Compare with the current largest weight, replace if the current weight is bigger.



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- Return the largest weight.



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Hmmm, you decide to analyze your solution: count how many additions the computer is executing.

1 You have n-1 subarrays of length 2 $(a_1, a_2), (a_2, a_3), \dots, (a_{n-1}, a_n)$ each requires one addition.

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- You have n-1 subarrays of length 2 $(a_1, a_2), (a_2, a_3), \ldots, (a_{n-1}, a_n)$ each requires one addition.
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- So the total number of additions required by this solution is:
- **o** Calculate: $\sum_{i=1}^{n-1} j \times (n-j) = \frac{1}{6}(n^3 n)$



Your friend tells you that his computer can execute 10,000,000,000 (10¹⁰) additions per second.

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MORE THAN 27 YEARS!



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So what are you going to do next?

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Or design a faster algorithm (an algorithm that executes a lot less additions).

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SO NOW YOU KNOW WHY WE NEED TO LEARN HOW TO COUNT!