

Ngày 16 tháng 11 năm 2012

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

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How do we count?

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

A list of counting problems can be found in the file Let Us Count.pdf.

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



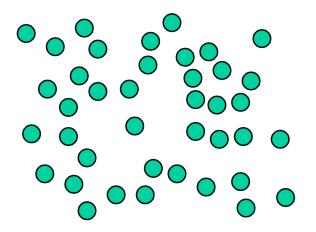
Counting

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How many students are attending this class?



How many green disks are in this picture?

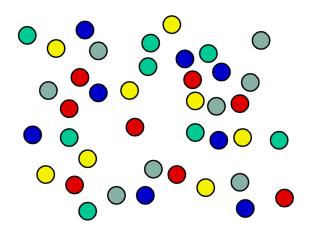


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And how about now?



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 Counting, especially of a large collection of objects, can be hard.

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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.

Counting

Why count?

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Counting

Why count?

You are a mathematician. Your friend, a programmer asks you:

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Question

I have an array with 10,000,000 integers. The weight of a segment $(a_i, a_{i+1} \dots, a_j)$ is : $\sum_{i=0}^{j} a_i$.

Counting

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.
- 2 Calculate the weight of each segment.
- Compare with the current largest weight, replace if the current weight is bigger.

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$$\bigcirc \sum_{i=1}^{n-1} j \times (n-j)$$

S Calculate:
$$\sum_{i=1}^{n-1} j \times (n-j) = \frac{1}{6}(n^3 - n)$$

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

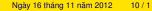
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There are 86400 seconds per day. So your friend's computer will run about: $\frac{10^{10}}{864000}$ seconds. Which is:

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MORE THAN 27 YEARS!

So what are you going to do next?

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Counting

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

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