

Tentamensskrivning

MMG610

Diskret Matematik

31/8 2010

- 1 [5] In how many ways can we permute the letters in the 'word' ABCCCC?
- 2 [5] Compute $10^{10^{10}}$ modulo 11
- 3 [5] Compute the Eulerfunction $\phi(n)$ för $n = 30030 = 2 \times 3 \times 5 \times 7 \times 11 \times 13$
- 4 [5] Compute the following Stirling numbers $\left\{ \begin{smallmatrix} 10 \\ 3 \end{smallmatrix} \right\}$ and $\left[\begin{smallmatrix} 9 \\ 4 \end{smallmatrix} \right]$
- 5 [10] How many integers below one thousand are only divisible by 2, 3 or 5?
- 6 [10] Is it true that 13 divides the Fibonacci number $F_{70000000}$? Motivate your answer.
Hint: 13 is a Fibonacci number itself
- 7 [10] Compute the sum $1 + 8 + 27 + 64 + 125 + \dots 1000000$
- 8 [10] Expand the rational function $\frac{x^5}{x^7-1}$ into a formal powerseries in x .
- 9 [15] Find the largest integers n such that 10^n divides $10^6!$
- 10 [15] Let S be a set with 100 elements. Compute the number of subsets, the cardinalities of which are divisible by three.

Hand calculators are permitted.

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