

Discrete Mathematics – CMSC-37110-1 Homework 1 – September
27, 2005

Instructor: László Babai Ry-164 e-mail:
laci[at]cs[dot]uchicago[dot]edu

HOMEWORK. Please print your name on each sheet. Please try to make your solutions readable. Unless expressly stated otherwise, all solutions are due at the **beginning of the next class**.

1.1 (4 + 4 points) Prove Pascal's identity:

$$\binom{n}{k} = \binom{n-1}{k} + \binom{n-1}{k-1}.$$

Give two proofs:

- (a) Algebraic, based on the binomial theorem.
- (b) Combinatorial, by counting the same set of objects in two different ways.

Due Thursday before class.

1.2 (challenge problem) For what values of n does the following hold:

$$\binom{n}{0} + \binom{n}{4} + \binom{n}{8} + \dots = 2^{n-2}.$$