CS 3333 Mathematical Foundations   Spring '11

Recitation 9   Practiced on: 3/7 & 3/9   5:30 - 6:20 pm

Binomial Coefficients

Note: These problems are designed for practice during a 50 minute recitation.
   a) **Easy** problems: expected to be solved in *5 min*.
   b) **Medium** problems: expected to be solved in *30 min*.
   c) **Hard** problems: expected to be solved in *15 min*.
   During the recitation, you may discuss the problems with your peers and the TA. Please control your volume and don't annoy others. An electronic copy of these problems and solutions will be posted on the following URL: http://cs.utsa.edu/~btang/pages/teaching.html.

Questions:

1.   (Easy, 2 min) Find the expansion of $(x + y)^6$. (Textbook [KR] Page 369: 3)

2.   (Easy, 3 min) What is the coefficient of x^9 in $(2 - x)^{19}$? (Textbook [KR] Page 360: 7)

3.   (Medium, 10min) What is the coefficient of $x^{101} y^{99}$ in the expansion of $(2x - 3y)^{200}$? (Textbook [KR] Page 361: 9)

4.   (Medium, 10 min) Show that $\binom{n}{k} \leq 2^n$ for all positive integers n and all integers k with $0 \leq k \leq n$. (Textbook [KR] Page 361: 15)

5.   (Medium, 10min) Prove Pascal's Identity, using the formula for $\binom{n}{r}$. (Textbook [KR] Page 361: 19)

6.   (Hard, 15 min) Let n be a positive integer. Show that $\binom{2n}{n+1} + \binom{2n}{n} = \binom{2n+2}{n+1}/2$. (Textbook [KR] Page 361: 25)

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