Math 2001 Assignment 43

Your name here

Due Friday, December 12

Problem 1.   (i) Prove the following formula for all natural numbers $n \geq 3$ and $0 \leq k \leq n$:

$$\binom{n}{k} = \binom{n-3}{k-3} + 3\binom{n-3}{k-2} + 3\binom{n-3}{k-1} + \binom{n-3}{k}$$

(ii) Conjecture a formula for each natural number m that specializes to the formula above when $m = 3$, and the two formulas proved in class when $m = 1$ or $m = 2$:

$$\binom{n}{k} = \binom{n-1}{k-1} + \binom{n-1}{k} \qquad \text{for } n \geq 1$$

$$\binom{n}{k} = \binom{n-2}{k-2} + 2\binom{n-1}{k-1} + \binom{n}{k} \qquad \text{for } n \geq 2$$

Problem 2. Scheinerman, §17, #29

Problem 3. Scheinerman, §17, #30

Problem 4. Scheinerman, §17, #32

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