Due: Friday, September 15

1. Page 398, problem 70
2. Page 414, problem 38
3. Page 422, problem 28; also, prove this by induction
4. Page 434, problem 58, parts (b) and (c)
5. Page 442, problem 26
6. Consider the combinatorial identity

\[ \binom{k}{2} = 3 \binom{k+1}{4}. \]

(a) Prove this identity by algebraic manipulation.

(b) Give a combinatorial proof. (Hint: The lefthand side counts the number of combinations of two combinations of \(k\) items taken two at a time. Consider the following algorithm for generating such an item: Take the \(k\) items and add a \(k+1\)st element “DUP”. Each pair of combinations of \(k\) items taken two at a time can be obtained by choosing 4 items from the expanded set of \(k+1\) elements. If none of those four is DUP, there are 3 possible pairs of combinations of two items (why?). If one of those items is DUP, any one of the three other items can be duplicated to get a total of 4 elements. In that case, how many possible pairs of combinations of two items are there?)