Analytical methods 2006
Midterm review

1. Given a variant of the *Tower of Hanoi* problem, derive a recurrence for the minimum number of moves.

2. Given a variant of the *intersecting lines* problem, derive a recurrence for the maximum number of regions.

3. Given a variant of the *Josephus* problem, derive a recurrence for it.

4. Solve a recurrence using the repertoire method.

5. Solve a recurrence using the idea of multiplying by a *summation factor*.

6. Determine a closed form expression for a sum, using the perturbation method.

7. Determine a closed form expression for a sum, using the method from differential calculus discussed in class.

8. Determine a closed form expression for a multiple sum, using standard manipulations – especially, (i) manipulations of the upper or lower triangle of symmetric sums, and (ii) changing the order of the indices.

9. Determine a closed form expression for a sum, using integrals.

10. Determine a closed form expression for a sum, using the *expand and contract* method.

11. Evaluate a sum using finite calculus.

12. Write a proof, using induction.