The University of Waikato, Department of Mathematics

Topics in Pure Mathematics: Generating Functions, math319-10B Assignment 2, due Friday 1st Oct 2010 - through the 252 slot outside G3.19.

1. In the section of our work on Stirling numbers, a derivation of the formula for α_r on page 18 was left to the student. Supply the derivation. Then for the Bell numbers $b(n)$, compute $b(3)$ by hand and then derive the expansion of the generating function

$$B(x) = e^{e^x - 1} = 1 + x + x^2 + \frac{5}{6}x^3 + O(x^4)$$

so you can check your calculation of $b(3)$.

2. Count the number of necklasses, having no clasp, with 2 colours and 7 beads by listing them all, and then check your result using Burnside-Polya counting.

3. Sieve the positive integers up to 40 using the sieve of Erastothernes. Then show how this is an example of inclusion/exclusion using a Ven diagram and the primes, 2,3,5. Finally count the number of permutations with exactly 2 fixed points of $\{1, 2, 3, 4, 5\}$ using the method described on page 26 of the lecture notes.

23 September 2010.