

# General Mathematics and ACM II

## Exercise 14

April 1, 2011

1. *Extension from last exercise sheet:* Kac ring paper, Exercise 12.

*Hints:*

- (a) Use Stirling's formula in the form

$$k! \sim \sqrt{2\pi k} k^k e^{-k}.$$

- (b) It is helpful, though not necessary, to take the logarithm of the equation for the half-width early on.
- (c) Note that  $\ln(n + w) = \ln n + \ln(1 + w/n)$ . Then use the log-series

$$\ln(1 + x) = x - \frac{x^2}{2} + O(x^3)$$

to approximate such terms. (All other logarithms, except the  $\ln 2$  which survives into the final answer, should cancel identically.)

2. Kac ring paper, Exercise 17.
3. Kac ring paper, Exercise 19.

(Use Matlab, Mathematica, or similar. It would be nice to plot your solution from Exercise 17 as well.)