

## 1B45 Mathematical Methods Problem Sheet 2 2005/2006

**Staple** securely your answer sheets together and put **your name** and your **tutor's name** (Prof. T. W. Jones if you are not in the P+A department) on your script.

Please hand in your solutions at the Friday Lecture on 28th. October 2005

1. Obtain the binomial expansion for  $(x - a)^8$  by evaluating the binomial coefficients  ${}^8C_r$  and each term in the expansion. [6]

2. By extending the method used in the lectures to determine  $\sum_{r=1}^n r^2$ , and by expanding binomial expansions as required, show that [8]

$$\sum_{r=1}^n r^3 = \left[ \frac{n(n+1)}{2} \right]^2.$$

3. Sum the series

$$\sum_{r=1}^n (r+1)(r+3)$$

using without proof, the appropriate results from your lecture notes. [8]

4. Sum the series [8]

$$S_n = a + (a+d)r + (a+2d)r^2 + \dots + [a + (n-1)d]r^{n-1} = \sum_{n=0}^{n-1} (a+nd)r^n.$$