

**Flanders Math Olympiad 1988**

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by Peter

- 1 show that the polynomial  $x^4 + 3x^3 + 6x^2 + 9x + 12$  cannot be written as the product of 2 polynomials of degree 2 with integer coefficients.

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- 2 A 3-dimensional cross is made up of 7 cubes, one central cube and 6 cubes that share a face with it.  
The cross is inscribed in a circle with radius 1. What's its volume?

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- 3 Work base 3. (so each digit is 0,1,2)  
  
A good number of size  $n$  is a number in which there are no consecutive 1's and no consecutive 2's. How many good 10-digit numbers are there?

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- 4 Be  $R$  a positive real number. If  $R, 1, R + \frac{1}{2}$  are triangle sides, call  $\theta$  the angle between  $R$  and  $R + \frac{1}{2}$  (in rad).  
  
Prove  $2R\theta$  is between 1 and  $\pi$ .

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