

**Flanders Math Olympiad 2005**

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by Peter, Psycho

- 1 For all positive integers  $n$ , find the remainder of  $\frac{(7n)!}{7^n \cdot n!}$  upon division by 7.

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- 2 We can obviously put 100 unit balls in a  $10 \times 10 \times 1$  box.  
How can one put 105 unit balls in? How can we put 106 unit balls in?

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- 3 Prove that  $2005^2$  can be written in at least 4 ways as the sum of 2 perfect (non-zero) squares.

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- 4 If  $n$  is an integer, then find all values of  $n$  for which  $\sqrt{n} + \sqrt{n + 2005}$  is an integer as well.

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