**Mathematics 1101Y – Calculus I: functions and calculus of one variable**
TRENT UNIVERSITY, 2010–2011

**Solutions to Assignment #5**
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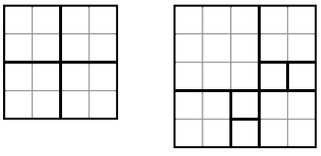
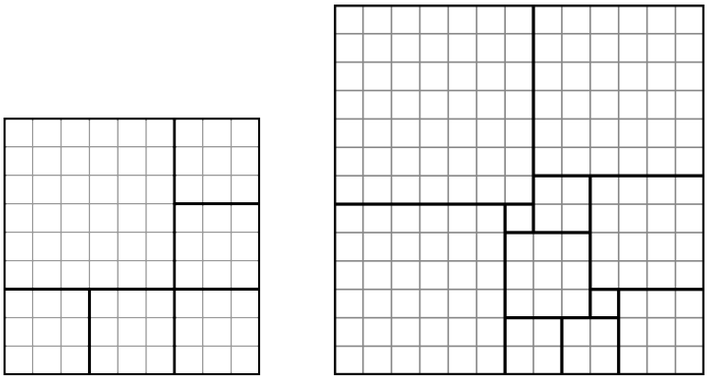
The general problem is to divide an $n \times n$ for some integer length $n$ into the least possible number of squares with sides of length strictly less than $n$. For example, any square with sides of even length, say $2k \times 2k$, can be divided into four $k \times k$ squares. Note that, in general, the smaller squares do not all have to be the same size. Optimal divisions for $4 \times 4$ and $5 \times 5$ squares are given in the diagram below.



**1.** Divide a $9 \times 9$ square into as few squares which each have sides of integer length strictly less than 9 as you can. Provide a picture! *[5]*

**2.** Divide a $13 \times 13$ square into as few squares which each have sides of integer length strictly less than 9 as you can. Provide a picture! *[5]*

SOLUTIONS. A $9 \times 9$ square can be divided into six smaller squares and a $13 \times 13$ square can be divided into eleven smaller squares, as the following diagram demonstrates:



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