

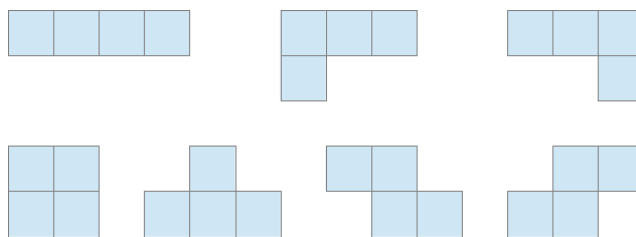
Mathematics 1100Y – Calculus I: Calculus of one variable

TRENT UNIVERSITY, Summer 2012

Solutions to Assignment #5

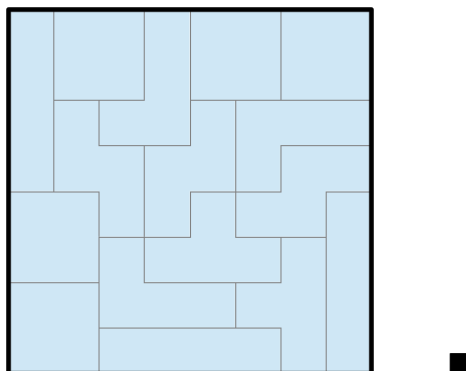
Tetris, anyone?

Consider the *tetrominoes*, the shapes that can be assembled out of four squares of equal size stuck together edge-to-edge in the same way that dominoes are assembled out of two squares at a time. There are five possible tetrominoes if one counts flipped versions as being the same, and seven if one doesn't. These are the seven shapes that occur in the game Tetris:



1. Find a way to cut up a standard 8×8 chessboard into tetrominoes, such that each square of the board is a square of a tetromino, with no gluing squares together after cutting them out permitted, and with each of the seven shapes being used at least once. [5]

SOLUTION. Here is one of very many ways:



2. Explain why a 9×9 chessboard cannot be cut up into tetrominoes in such a way. [5]

SOLUTION. A 9×9 chessboard would have $9^2 = 81$ squares, of which each tetromino piece would use 4. Cutting out 20 tetrominoes from the board would use up $20 \cdot 4 = 80$ squares, leaving exactly 1 left over. This is not enough to make another tetromino, so one cannot cut the board up into tetrominoes in this way. ■