**Mathematics 2084H – Recreational mathematics**
Trent University, Winter 2009
Assignment #5
Due on Friday, 20 March, 2009.

Reptiles and polyominos

A polygon is said to be a *reptile* if it can be dissected into pieces of equal size, each of which is a scaled-down version of the original polygon. For example, the "L" *tromino*, made up of three squares stuck together edge-to-edge, but not in a row,
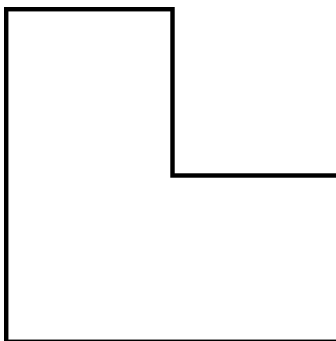
is a reptile, as demonstrated by the following dissection:
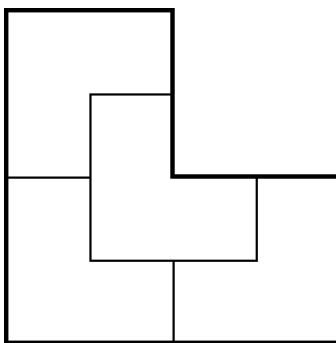
1. Find another dissection of the "L" tromino given above that demonstrates it is a reptile. *[2]*

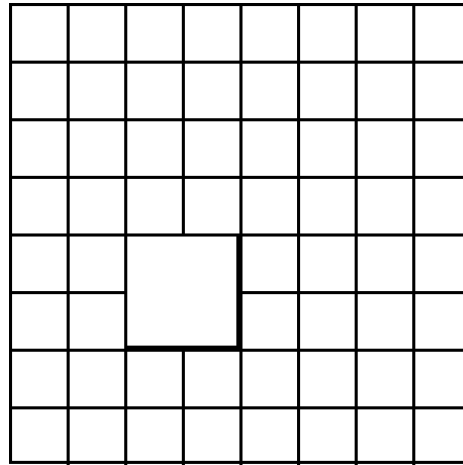**2.** Which regular polygons are reptiles? Why? *[3]*

The contiguous polygons formed by putting together five squares are the *pentominos*, which are used in a number of puzzzles.

The "official" pentomino designations:

Z   F   I   L   N   P

T   U   V   W   X   Y
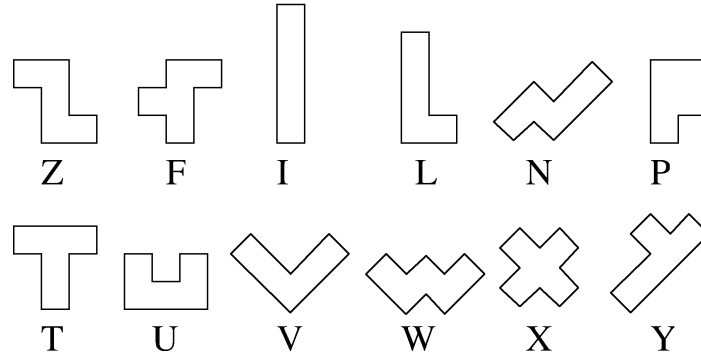
3. Consider the 8×8 chessboard with a 2×2 block removed, as in the diagram below.

Dissect this shape along the borders of the squares into 12 pieces, each of which is a different pentomino. *[2]*

4. Determine which of the 12 pentominoes are reptiles. *[3]*

Note: In all of these problems, you're allowed to rotate, move, and flip the pieces used in the dissections at will.