

MTHT 400
Methods of Teaching Secondary Mathematics I
FALL 2005

John T. Baldwin

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Patterns and Proofs

due: Oct. 5, 2005

1. Checkerboard squares (first chapter of IMP)
 - (a) How many squares are there on an ordinary checkerboard. (Hint: the answer is *not* 64.
 - (b) Develop a formula for the number of squares on an $n \times n$ checkerboard.
 - (c) Justify your formula for high school students. The main point is to help them see that it needs justification.
 - (d) Prove your formula.
2. Consider a circle with n points on it. How many regions will the circle be divided into if each pair of points is connected by a chord?
 - (a) Is this question well-formed? That is does the answer depend on the placement of the points.
 - (b) Variant: What is the maximum number of regions of a circle that you can make by drawing chords between n points on the circumference?
 - (c) Guess the formula? Be very careful.
 - (d) Extra credit if you actually prove the result.
3. Many prealgebra and algebra texts contain exercises that present students with a few numbers or pictures and ask them to describe the pattern or find the 100th number in the sequence. Find an example where such a problem is well-posed and one where it is not. (You can look in books or on the internet.)