Homework #4. Due: Thurs 10/5

1. In class we discussed the concept of an "analytic proof", and how it's related to one view of mathematics; namely, the view that describes mathematics as a *formal system*. What are some characterisitcs of this view of mathematics?

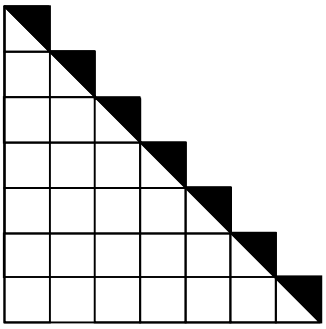
2. How does the view of mathematics as a formal system differ from a view that claims mathematics is about real objects (numbers, geometric figures, sets, *etc*), and that the role of mathematicians is to *discover* properties of these objects?

3. "Picture proofs" are supposed to be ways of demonstrating the truth of a mathematical claim in pictures, without appealing to formal languages, formal rules, and analytic proofs. In what sense does a picture proof demonstrate the truth of a mathematical claim?

4. Explain how the following picture proofs demonstrate the truth of the associated mathematical claim:

(a) *Claim*: $1 + 2 + 3 + ... + n = \frac{n^2}{2} + \frac{n}{2}$

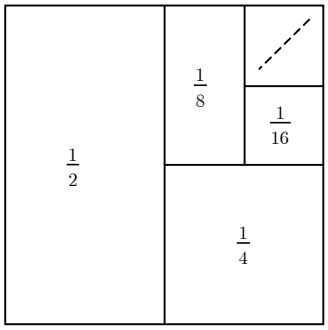
Picture Proof:



$n = 7$

(b) *Claim*: $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \cdots = 1$

Picture Proof:



(c) *Claim*: The square on the hypotenuse of a right triangle is equal to the sum of the squares on the other sides.

Picture Proof: