




INTRO TO ABSTRACT MATH  
FALL 2009

HOMEWORK 7  
DUE SEPTEMBER 21

**Exercise 22.** Use induction to prove the power rule from Calculus. That is, for all  $n \in \mathbb{N}$ ,  
$$\frac{d}{dx}x^n = nx^{n-1}.$$

**Exercise 23.** Prove that for all  $n \in \mathbb{N}$

$$(1 + 2 + 3 + \cdots + n)^2 = 1^3 + 2^3 + 3^3 + \cdots + n^3.$$

**Exercise 24.** Let  $n \in \mathbb{N}$ . Show that if a single square is removed from a  $2^n \times 2^n$  grid, then the resulting figure can be completely covered by non-overlapping tiles of the form . An example of such a covering in the  $n = 3$  case is shown below.

