Complete, last update: 1:47pm, Sept 15.

Math 347H: Fundamental Math (H) HOMEWORK 2 **Due date: Sept 21 (Thu)**

Exercises from Sally's book. 1.5.2, 1.5.3, 1.5.6, 1.5.8, 1.5.10, 1.5.14(i)

Other (mandatory) **exercises.**

1. Prove Facts 1.5.1(2).

2. Prove that the statement in Exercise 1.5.4 implies the cancellation for multiplication law (C). Recall that I proved the reverse implication in class, so the two statements are indeed equivalent.

3. For a set $X := \{v_0, v_1, v_2, v_3, v_4\}$ and for each of the requirements below, construct an example of a binary relation R on X satisfying this requirement. You can draw each of these examples, putting an arrow $v_i \to v_j$ to mean that $(v_i, v_j) \in R$.

(a) R is nonsymmetric (i.e. not symmetric), but not antisymmetric.

(b) R is nonreflexive, but not irreflexive.

(c) R is irreflexive, antisymmetric, and transitive.

(d) R is reflexive, symmetric, and transitive.

(e) R is a partial (nonstrict) order, but not a total order.

(f) R is a total strict order.

4. Prove the formula for the sum of squares: for every $n \in \mathbb{N}$, $\displaystyle\sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}$.