Name: _____ Student ID: _____ Section: _____

**Instructions.**   Grading is based on method. SHOW ALL WORK.

1. (10 points) Let $L$ be a lattice. Suppose that $x \wedge (y \vee z) = (x \wedge y) \vee (x \wedge z)$ for every $x, y, z \in L$. Show that

$$x \vee (y \wedge z) = (x \vee y) \wedge (x \vee z)$$

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**Instructions.** Grading is based on method. SHOW ALL WORK.

Submit solutions at the beginning of class on Monday.

2. (10 points) Let $P_n$ be the set of all integer partitions of $n$ with partial order defined as follows. For $a = (a_1, a_2, \ldots, a_k)$ and $(b_1, b_2, \cdots, b_m)$, then $a \geq b$ if for all $j \in [k]$, the following inequality holds

$$\sum_{i=1}^{j} a_i \geq \sum_{i=1}^{j} b_i$$

For example, in $P_4$ we have that $(3, 1) \geq (2, 1, 1)$ since

$$3 \geq 2 \quad \text{and} \quad 3 + 1 \geq 2 + 1$$

It turns out that $P_n$ is a poset. Is $P_n$ a lattice? Why or why not?