

Due: Friday Sept 06, 11:59 PM

30 points

1. Prove that

$$\forall P, Q \in \mathbb{B}. (P \Rightarrow Q) \Leftrightarrow (\neg P \vee Q)$$

Note that  $\mathbb{B}$  is “booleans”, so  $P$  and  $Q$  are propositions. Also note that another way to phrase this questions is to show that the two are equivalent. While you may typically just use the logical equivalences in your logic handout, you **may not** just directly use this equivalence, as we are asking you to prove it.[10 points]

2. Prove that

$$\forall n \in \mathbb{N}. \sum_{i=0}^n i^3 = \frac{1}{4}n^2(n+1)^2$$

Hint: use induction on  $n$ . [20 points]