CSE2315: Homework 3
Out: February 20
Due: February 27.

1. (20 points) Predicate Logic.
   (a) Show that the argument $(\forall x)[P(x) \vee Q(x)] \to [[(\exists x)P(x)]' \to (\forall x)Q(x)]$ is valid.
   (b) Establish the validity of the following argument:
   Every member of the board comes from industry or government. Everyone from government who has a law degree, is in favor of the motion. John is not from industry, but does have a law degree. Therefore, if John is a member of the board, he is in favor of the motion.

2. (10 points) Prove that the difference between the cubes of consecutive numbers is always odd.

3. (10 points) Prove the following statement using contraposition: If a number x is positive, then so is $x + 1$.

4. (10 points) The sum of an integer and its square is even.

5. (10 points) Inductive Proof. Prove that $\sum_{i=1}^{n} \frac{1}{i^2} < 2 - \frac{1}{n}, n \geq 2$