Suggested reading for this week (from the textbook): §2.2

Study items for PSet 3:

- Truth tables, and their use in proving tautologies or that logical expressions are equivalent.
- Proving biconditionals in two parts ("⇒" . . . "⇐")
- Direct proofs
- Indirect proofs: the distinction between proofs by contradiction and proof by contrapositive.

Problems from the book: (First two numbers refer to the section number. The phrase in parentheses is just a brief summary to remind you which problem is about what when you scan this sheet later.)

- 1.4.6 (prove distributivity of \( \land \) over \( \lor \) via truth table)
- 1.4.9 (verify a tautology via truth table.)
  
  NOTE: a “tautology” is a logical expression that is always True, regardless of the truth values of the individual propositions.
- 1.4.12 (does parenthesis placement matter with \( \lor \) and \( \land \)?)
- 1.5.5 (generalized de Morgan laws)
- 1.6.11 (Truth tables with implications; four parts)
- 2.1.6 (biconditional about a polynomial)
- 2.1.8 (\( n^3 + n \) is always even)
- 2.1.9(a) (sums of three consecutive integers)
- 2.1.13 (sum of rational and irrational)
- 2.1.16 (\( \sqrt[3]{2} \notin \mathbb{Q} \))

Supplemental problems:

1. Prove that \((P \land Q) \Rightarrow R\) is logically equivalent to \(P \land \sim R \Rightarrow \sim Q\).

2. (a) Let \( m \in \mathbb{Z} \). Prove that either \( m^2 = 4k \), with \( k \in \mathbb{Z} \), or \( m^2 = 4k + 1 \), with \( k \in \mathbb{Z} \).
   
   (b) Let \( a, b, c \in \mathbb{Z} \). Prove that if \( a^2 + b^2 = c^2 \), then at least one of \( a \) and \( b \) is even. (Hint: Use part a))

due Wednesday 2/18 by 10pm.