Homework #2

These problems are due on Thursday, October 6.

1. page 9 (text) #5 b, d, e, h, j.
2. page 16 (text) #3 b, d, e, f.
3. page 16 (text) #15 a, b.
4. (a) Prove (using truth tables) the following tautology:
   \[
   \neg (p \rightarrow q) \iff (p \land \neg q).
   \]
   (b) Use 4(a) to negate the following implications:
   i. If \( x^2 = 4 \), then \( x = 2 \).
   ii. If \( x \leq 4 \), then \( 2x \leq 8 \).
5. (a) Give a direct proof of the fact that \( a^2 - 5a + 6 \) is even for any integer \( a \).
   (b) Prove that \( \sqrt{3} \) is irrational. (Hint: Use an indirect proof.)