

Math 200 – Homework 3

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This assignment is due on **Friday, February 24, 2017** at 9:50 AM.

Reading: Sections 4.2, 4.3, and 4.4 of Chapter 4. Hopefully section 4.2 is straightforward to you so that you can just skim it (the most important thing here is the definition of a rational number and how to do operations on them). Skip the proof of Theorem 4.3.4, because we'll find a way cooler proof once we'll do Chapter 5 (Induction). You can skip the proofs of the 'Absolute Value' section in 4.4, but do know the results (which you're hopefully familiar with).

- **Section 4.2:** 7 (look at 6 for a hint), 22, 25, 31
- **Section 4.3:** 18, 28, 37(c), AP1, AP2
- **Section 4.4:** 19, 37, 40 (use $n^2 - 1 = (n - 1)(n + 1)$)

Additional Problem 1: Recall that m is a perfect square if and only if $m = a^2$ for some nonnegative integer a . Show that if $m = a^2$ is a perfect square and $n = b^2$ is a perfect square and moreover $b|a$ (so $b \neq 0$), then $\frac{m}{n}$ is also a perfect square.

Additional Problem 2: Use Theorem 4.3.5 (the Fundamental Theorem of Arithmetic) to show that if p is *prime* and $p|ab$, then $p|a$ or $p|b$ (mentally compare this with problem 28).

Hint: To show $P \Rightarrow (Q \vee R)$, assume P and not Q , and show R . Remember this proof technique for later on. Use the fact that if p is *prime* then $p|(p_1^{e_1} \cdots p_k^{e_k})$ if and only if $p = p_i$ for some i .