MATH 13 HOMEWORK 2
DUE: Wednesday, Apr 18

INSTRUCTIONS: Work on this homework in groups of 1-3 persons. When you turn in the homework, put the names of your group members on the front page. Also, clearly indicate who writes what problems on the homework's solution.

READING ASSIGNMENT: Read Sections 2.2, 2.3 of the course notes.

PROBLEMS FROM COURSE NOTES: Do problems 2.2.3(c), 2.2.11, 2.3.3, 2.3.4, 2.3.15

ADDITIONAL PROBLEMS:

1. Read

    http://projectwordsworth.com/the-paradox-of-the-proof/

    (You can find it by googling "Paradox of the proof".) Don't worry about understanding what the ABC Conjecture asserts. Instead focus on what the article says regarding the social aspects of doing mathematics and proving theorems.

2. (a) Prove that $\sqrt{3}$ is irrational.
   (b) What kind of positive integer n has the property that $\sqrt{n}$ is irrational? Can you form a conjecture (without proof) about such n's?

3. Consider the statement: We have that $x + y$ is irrational only if at least one of x and y is irrational.

   (a) Rewrite this statement in if-then form.
   (b) Write out the contrapositive of this statement.
   (c) Do the two statements necessarily have the same truth value?
   (d) Prove or disprove one of the two statements.

4. Consider the statement: The polynomial $x^3 - 10x + 1$ has no roots in the interval $3 \leq x \leq 5$.

   (a) Rewrite this statement in if-then form.
   (b) Write out the contrapositive of this statement.
   (c) Do the two statements necessarily have the same truth value?
   (d) Prove or disprove one of the two statements. (You can use results from calculus if they help.)