MATH 13 WINTER 2016 HOMEWORK 1

Due: Wednesday, January 20. Please turn in at the lecture.

Student name/id (include all students in the group):

IMPORTANT INSTRUCTIONS: It is crucial that you write your arguments clearly and that each argument clearly shows how you arrive at the conclusions from the assumptions. This is the point of homeworks – to practice understanding of the material, proofwriting, and the ability to express your understanding.

When preparing the homeworks, please follow the **Rules for homeworks** on the course webpage under **Course information and policies** and also the guidelines under **Grading**. In particular, keep in mind the **Aspects of grading** in the **Grading** section.

1. Consider statements P, Q and R such that $(P \vee Q) \implies R$ is true.

(a) **(2pt)** Is $P \implies R$ true?

(b) **(2pt)** Is $\neg R \implies \neg Q$ true?

Prove or disprove.

2. Let n be an integer. Prove:

(a) **(4pt)** $n^2 - 1$ is divisible by 3 iff n is not divisible by 3.

(b) **(4pt)** $n^3 - 1$ is divisible by 9 iff n gives remainder 1 when divided by 3.

3. (4pt) Is the product of three consecutive integers divisible by 6? Prove or disprove.

4. (4pt) Prove that $\sqrt{3}$ is not a rational number.