# MAT4010 Pretest Decimal Expansion

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The goal of this pretest is to make you think about some questions related to "school mathematics from an advanced viewpoint". You will discuss these questions in breakout rooms at the beginning of class. This will both force you to reflect about your understanding of these topics, and help me gauge your understanding.

When we finish this part of the course, your homework will be to both write up the answers to the questions, and to answer some questions about the relationship between these questions and school mathematics. All the questions will be discussed in the lectures, but writing up the answers will be a good way for you to review.

You will not be marked on this test, and you can work on it in groups. You can either submit based on the breakout groups or groups of 1–4 people that you form yourself. These pretest-homeworks constitute the "oblig" part of the course, and must be submitted in order to take the exam.

## 1 Before the Lectures

1.1. Is $0.\overline{9} = 0.999\ldots$ less than 1, equal to 1 or bigger than 1?

1.2. Prove that a number is rational if and only if it has a terminating or repeating decimal expansion.

1.3. Why does $1/2$ have a terminating decimal expansion? Why does $1/3 = 0.\overline{3}$ have a repeating decimal expansion where the repeating block start right after the decimal point? Why does $1/6 = 0.1\overline{6}$ have a repeating decimal expansion where there is a digit between the decimal point and the repeating block?

1.4. Which fractions $m/n$ have a terminating decimal expansion? (We can assume that $m$ and $n$ do not have any common factors.)

# 2 Homework after the lectures

2.1. Write up answers to the questions above.

2.2. Was there anything in this chapter that you enjoyed learning about or that changed the way you look at this topic? Will this influence your teaching, either directly or indirectly?

2.3. Which of the questions above do you think are likely to come up in your teaching and in which situations? Do you think they will come up often? Do you think they will come from strong students, average students or weak students?

2.4. Name three additional situations where the material in this chapter could be useful for your teaching, either directly or indirectly? For instance when planning your teaching, responding to questions, clarifying your own understanding or other situations.

2.5. Can you imagine other questions that students might ask? Were there other questions that you wondered about when you were in school?