

MAT 311 Introduction to Number Theory

**Problem Set 9**

due Wednesday, April 29

Please prove all your answers.

**Problem 1.** (a) For a real number between 0 and 1, describe how to get its binary expansion (i.e. encode it in the form like  $.01100100111010101\dots$ ). Mimic the procedure for decimal expansions.

(b) Characterize (with proof) the numbers that have finite binary expansions.

(c) Characterize (with proof) the numbers that have periodic binary expansions.

Please also do questions 1, 3, 5 from Sec. 7.1, 3 from Sec. 7.2.