

**MATH 401 INTRODUCTION TO ANALYSIS-I,  
FALL TERM 2009, PRACTICE EXAM 2**

*Note that Exam 2 is on Monday 26th October in Room 207 Sackett, 1:25-2:15*

1. Suppose that  $x$  is a real number with  $x > 1$ .

(i) Prove that  $x < x^3$ .

(ii) Prove that  $1 < x^5 < x^7$ .

2. Determine the set

$$\mathcal{A} = \left\{ x : \frac{x+5}{x^2+2} < \frac{2}{x} \right\}$$

3. Prove that there is no rational number  $x$  such that  $x^2 = 5$ .

4. Prove that if  $n \in \mathbb{N}$ , then  $3^n > n^2$ .