

**MATH 401 INTRODUCTION TO ANALYSIS-I,
SPRING TERM 2024, PROBLEMS 4**

INEQUALITIES, MODULUS

Return by Monday 5th February

1. Find all real values of x such that

$$\frac{x+1}{x^2+3} < \frac{2}{x}.$$

2. (i) Prove that, for any real number a , $|a|^2 = a^2$.
(ii) Let a and b be real numbers. Show that $|a+b| = |a| + |b|$ if and only if $ab \geq 0$.
3. Suppose that a, b, x, y are real numbers satisfying $a < x < b$ and $a < y < b$. Show that $|x-y| < b-a$.
4. Sketch the graph of the equation $y = |x| - |x-1|$.
5. Find all x such that $|x+1| + |x-2| = 7$.