MATH 140A Review: Inequalities and Absolute Values

Facts to Know:

We say that f is increasing if the following holds:

- If $a < b$, then

We say that f is decreasing if the following holds:

- If $a < b$, then

Properties of inequalities:

1. **(addition)** $a < b \iff$
2. **(multiplication by $\epsilon > 0$)** $a < b \iff$
3. **(multiplication by $\epsilon < 0$)** $a < b \iff$

Example: Prove that the function $f(x) = \frac{1}{(x \ln x)+1}$ is decreasing for $x > 1$ (don't take the derivative).

Facts to Know:

The absolute value of x is defined by

$$|x| =$$

Then,

$$|x| < \epsilon$$

Properties of absolute value:

1. $|a \cdot b| =$

2. Does $|a + b| = |a| + |b|$ generally hold?

3. $|a + b| \leq$

Example: Let $n = 1, 2, \ldots$. Determine for what values of n the following holds

$$\left| \frac{7n+5}{3n-4} - \frac{7}{3} \right| < \frac{1}{2020}.$$