

Problem Set #2

Due: 22 September 2011

1. Find all $x \in \mathbb{R}$ for which $\frac{2x+3}{x+5} \leq \frac{x+1}{|x-1|}$.

2. Solve the inequality $\frac{x\sqrt{|x^2-4|}}{x^2-4} - 1 > 0$.

3. Let x, x_0, y, y_0 be real numbers and let ε be positive real number. If we have

$$|x - x_0| < \min\left(\frac{\varepsilon}{2(|y_0| + 1)}, 1\right) \quad \text{and} \quad |y - y_0| < \frac{\varepsilon}{2(|x_0| + 1)},$$

then prove that $|xy - x_0y_0| < \varepsilon$.

Hint. Write $xy - x_0y_0$ in terms of $x - x_0$ and $y - y_0$ and use the triangle inequality twice.