

1. ASSIGNMENT 7

1.1. **Problem 1.** Decide whether the following proposition is true. If it is true, prove it. If it is false, provide a counterexample.

If the sequence x_n converges, then x_n/n also converges.

1.2. **Problem 2.** If x_n is a sequence that converges to 1, show that

$$\frac{x_n^2 - e}{x_n} \rightarrow 1 - e \quad \text{as } n \rightarrow \infty$$

1.3. **Problem 3.** Prove that $\{x_n\}$ is bounded if and only if there is a $C > 0$ such that

$$|x_n| \leq C \quad \text{for all } n \in \mathbb{N}$$

1.4. **Problem 4.** Suppose $\{x_n\}$ and $\{y_n\}$ both converge to the same real number. Show that

$$x_n - y_n \rightarrow 0 \quad \text{as } n \rightarrow \infty$$