LIMITS OF SEQUENCES

IN-CLASS PROBLEMS

1. Find the limits of the following expressions as \( n \to \infty \). The limits may not exist. Prove your answers using the definition of convergence.

a. \( \frac{1}{n^2+1} \)

b. \( \sqrt{n+1} - \sqrt{n} \)

c. \( \sin(n\pi) \)

d. \( \frac{1}{n} \sin(n) \)

e. \( \frac{n^2}{2^n} \)

HOMEWORK PROBLEMS

2. Find the limit of \( \sqrt[n]{n} \) as \( n \to \infty \).

Hint: write \( \sqrt[n]{n} = 1 + \chi_n \) and use the binomial theorem to find a suitable inequality for \( \chi_n \).