

Math313
Homework 3, due Friday, February 5

1. Let $\lim a_n = \alpha$ and $\lim b_n = \beta$. Show that

$$\lim_{n \rightarrow \infty} (a_n + b_n) = \alpha + \beta.$$

2. Prove the limits using the definition:

$$\begin{aligned}\frac{1}{n^2} &\rightarrow 0, \\ \frac{2n}{n+1} &\rightarrow 2, \\ \frac{n^2+1}{n^2-n+1} &\rightarrow 1, \\ e^n &\rightarrow +\infty, \\ \ln\left(\frac{1}{n}\right) &\rightarrow -\infty.\end{aligned}$$

3. Show that the sequences

$$(-1)^n n, \quad \cos(\pi n)$$

are divergent.