

**Math 441 - Homework 6**

**Due Friday, Oct. 18th**

1. (10 points) Use the  $\epsilon$ - $N$  definition of convergence to prove that  $\lim_{n \rightarrow \infty} \frac{1}{\sqrt[3]{n}} = 0$ .
2. (10 points) Suppose that  $A \subseteq \mathbb{R}$  is a closed set, and  $(s_n)$  is a convergent sequence such that  $s_n \in A$  for all  $n \in \mathbb{N}$ . Prove that  $\lim s_n \in A$ .
3. (10 points) Suppose that  $(s_n)$  is a convergent sequence such that  $a \leq s_n \leq b$  for all  $n \in \mathbb{N}$ . Prove that  $a \leq \lim s_n \leq b$ .
4. (10 points) Suppose that  $\lim s_n = s$  where  $s$  is a positive number. Prove that there exists  $N \in \mathbb{N}$  such that  $s_n > 0$  for all  $n > N$ .