

# Assignment 7

- 1 Let  $\{x_n\}$  and  $\{y_n\}$  be convergent sequences such that

$$x_n < y_n \quad \forall n \in \mathbb{N}$$

Show that

$$\lim_{n \rightarrow \infty} x_n \leq \lim_{n \rightarrow \infty} y_n$$

Give an example to show that strict inequality may not hold.

- 2 Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be the function given by  $f(x) = \sqrt[3]{x}$ . For what values of  $a \in \mathbb{R}$  is  $f$  differentiable?
- 3 Let  $f(x) = 0$  if  $x$  is rational and  $f(x) = x^2$  if  $x$  is irrational. Is  $f$  differentiable at  $x = 0$ ? If yes, what is  $f'(0)$ ?
- 4 Show that if  $f$  is differentiable at  $a$ , then it is also continuous at  $a$ .