

## 1.8 Videos Guide

### 1.8a

Definition: (continuous at  $a$ )

- A function  $f$  is continuous at a number  $a$  if  $\lim_{x \rightarrow a} f(x) = f(a)$ .
- Types of discontinuity
- Functions that are continuous

### 1.8b

Exercise:

- Find values of  $a$  and  $b$  that make  $f$  continuous everywhere.

$$f(x) = \begin{cases} \frac{x^2 - 4}{x - 2}, & x < 2 \\ ax^2 - bx + 3, & 2 \leq x < 3 \\ 2x - a + b, & x \geq 3 \end{cases}$$

### 1.8c

Theorem (statement):

- Intermediate Value Theorem: Suppose  $f$  is continuous on the closed interval  $[a, b]$  and let  $N$  be any number between  $f(a)$  and  $f(b)$ , where  $f(a) \neq f(b)$ . Then there is a number  $c \in (a, b)$  such that  $f(c) = N$ .

Exercise:

- Use the Intermediate Value Theorem to show that the equation has at least one real solution.

$$\frac{2}{x} = x - \sqrt{x}$$