

$$\text{Ex) } f(x) = \begin{cases} Kx+1, & x < 1 \\ x^2, & x \geq 1 \end{cases}$$

a) Find  $K$  so  $f(x)$  is continuous at  $x=1$

By def:

- $f(1)$  must exist  $f(1)=1 \checkmark$
- $\lim_{x \rightarrow 1}$  must exist
- $\lim_{x \rightarrow 1} = f(1)$

$$Kx+1 = x^2 \quad \text{at } x=1$$

$$K(1)+1 = 1^2$$

$$K+1=1$$

$$\boxed{K=0}$$

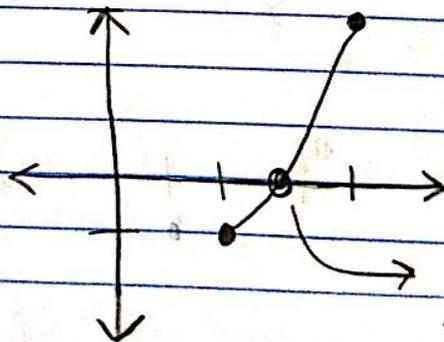
\* Intermediate Value Theorem (IVT)

- If  $f$  is continuous on the closed interval  $[a, b]$  and  $K$  is any # between  $f(a)$  and  $f(b)$ , then there is at least one #  $c$  in  $[a, b]$  such that  $f(c) = K$

Ex) Explain why  $f(x) = 2x^3 - 3$  has a zero in the interval  $[1, 2]$ .

$$f(1) = -1$$

$$f(2) = 13$$



must be a zero by IVT