Find c.n. of $f(x) = \begin{cases} x^2 - 2x & x \le 0 \\ 2x & x > 0 \end{cases}$.

$$f'(x) = \begin{cases} 2x - 2 & x < 0 \\ 2 & x > 0 \end{cases}$$

$f'(x) \neq 0$

f' $\nexists$ at $x = 0$ because $f'_+(0) = 2$ but $f'_-(0) = -2$

$\therefore$ Only cn is $x = 0$.

Find the rel. min of $f(x) = x + \frac{1}{x^2}$.

$$f'(x) = \frac{x^3 - 2}{x^3}$$

f' DNE at $x = 0$ (not c.n. $0 \notin f$)

$f'(x) = 0 \rightarrow x = \sqrt[3]{2}$

$$f''(x) = \frac{6}{x^4}$$

$f''(\sqrt[3]{2}) = 2.381 > 0 \rightarrow f$ CU

$\therefore f$ has a rel min of 1.890 at $x = \sqrt[3]{2}$.

Find the abs. ext of $f(x) = (x-1)^{1/3} + 4$ on $[0,2]$.

$$f'(x) = \frac{1}{3\sqrt[3]{(x-1)^2}}$$

$f'(x) \neq 0$

f' DNE at $x = 1$

$f(0) = 3$

$f(2) = 5$

$f(1) = 4$

$\therefore$ by EVT f has an abs max of 5 at $x = 2$ and an abs min of 3 at $x = 0$.