3.1

Maxima & Minima   extreme points
(Maximum)   Min
MAX

One point $\Rightarrow$ Max. pt. or Min pt

more than 1 $\Rightarrow$ $\begin{cases} RMAX & RMIN \\ or \\ LMAX & LMIN \end{cases}$

Absolute extreme $[a, b]$
   abs. Max, abs Min

Critical number. $\underline{CN}$ Critical point CP
   $\begin{matrix} x \\ t \end{matrix}$? (x, y)

How to find $\underline{CN}$ by forcing 1st derivative to be
   solve for the variable   equal 0.

$\underline{Ex}$ $f(x) = x^2$ $[-2, 1]$

$f'(x) = 2x = 0 \Rightarrow CN: x = 0$

x	$f(x)$
-2	4	$\longrightarrow$ abs. Max: $(-2, 4)$
0	0	$\longrightarrow$ abs. Min: $(0, 0)$
1	1

Ex $\quad g(t) = 8t - t^4 \qquad [-2, 1]$

$\quad g'(t) = 8 - 4t^3 = 0$

$$\qquad t^3 = 2 \Rightarrow \underline{t = \sqrt[3]{2}} \text{ CN} $$

t	$g(t)$	
-2	-32	$\rightarrow$ abs Min @ $(-2, -32)$
1	7	$\rightarrow$ abs Max @ $(1, 7)$

Ex $\quad f(x) = x^{2/3} \qquad [-2, 3]$

$\quad f'(x) = \dfrac{2}{3} x^{-1/3}$

$$\qquad = \dfrac{2}{3} \dfrac{1}{x^{1/3}} \neq 0$$

$\underline{\text{CN! } x = 0}$

x	$f(x)$	
-2	$\sqrt[3]{4}$	
0	0	$\longrightarrow$ abs. Min $(0,0)$
3	$\sqrt[3]{9}$	$\longrightarrow$ abs. Max $(3, \sqrt[3]{9})$

$f(\theta) = \sin\theta \qquad -\dfrac{\pi}{2} \le \theta \le \dfrac{5\pi}{6}$

$f'(\theta) = \cos\theta = 0$

$\qquad$ CN. $\theta = \pm \dfrac{\pi}{2}$

θ	$f(\theta)$	
$-\dfrac{\pi}{2}$	-1	$\longrightarrow$ abs. Min @ $(-\frac{\pi}{2}, -1)$
$\dfrac{\pi}{2}$	1	$\longrightarrow$ abs Max @ $(\frac{\pi}{2}, 1)$
$\dfrac{5\pi}{6}$	$\frac{1}{2}$	