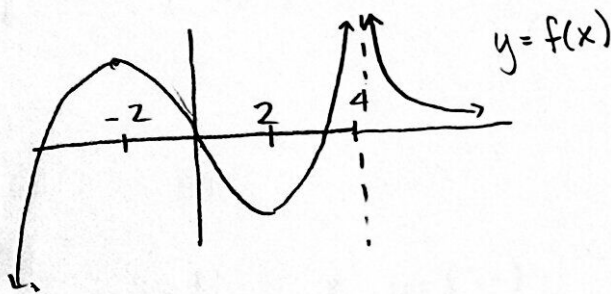


# Lesson 21: Graphical Interpretation of Derivatives

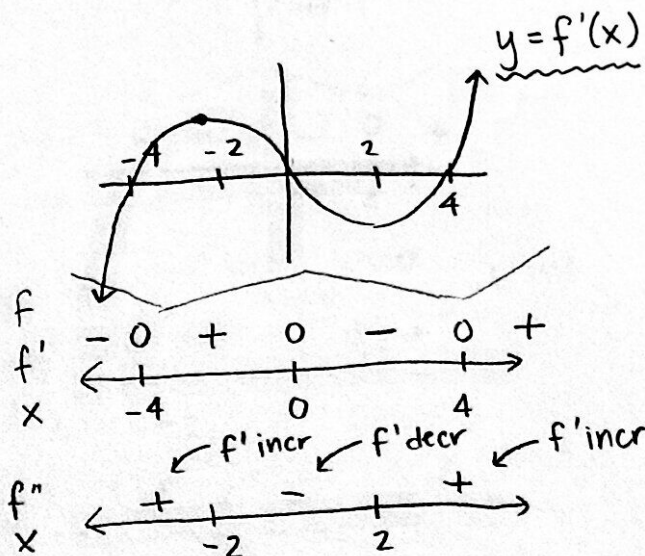
$f(x)$	Criteria	
1st deriv CV incr decr max min	$f'(c) = 0$ or DNE (and $f(c)$ exists) $f'(x) > 0$ $f'(x) < 0$ $f' \leftarrow \begin{array}{c} + \quad - \\   \\ c \end{array} \rightarrow$ $f' \leftarrow \begin{array}{c} - \quad + \\   \\ c \end{array} \rightarrow$	
	Warmup: If $f'(x)$ is incr, then $f''(x) > 0$ If $f'(x)$ is decr, then $f''(x) < 0$	
	2nd deriv CU CD IP's	$f''(x) > 0$ (or $f'(x)$ incr) $f''(x) < 0$ (or $f'(x)$ decr) $f'' \leftarrow \begin{array}{c} + \quad - \\   \\ c \end{array} \rightarrow$ or $f'' \leftarrow \begin{array}{c} - \quad + \\   \\ c \end{array} \rightarrow$

Ex 1



CV's:  $x = -2, x = 2$ ,  ~~$x = 4$~~   
 incr:  $(-\infty, -2) \cup (2, 4)$   
 decr:  $(-2, 2) \cup (4, \infty)$   
 max:  $x = -2$   
 min:  $x = 2$   
 CU:  $(0, 4) \cup (4, \infty)$   
 CD:  $(-\infty, 0)$   
 IP's:  $x = 0$

Ex 2



$f(x)$  CV's:  $x = -4, 0, 4$   
 incr:  $(-4, 0) \cup (4, \infty)$   
 decr:  $(-\infty, -4) \cup (0, 4)$   
 max:  $x = 0$   
 min:  $x = -4, 4$   
 CU:  $(-\infty, -2) \cup (2, \infty)$   
 CD:  $(-2, 2)$   
 IP's:  $x = -2, 2$