

$$6. \quad y = 2x^3 + 3x^2 - 36x + 12$$

FIND RELATIVE EXTREMA USING SECOND DERIVATIVE TEST

① FIND FIRST DERIV.

$$y' = 6x^2 + 6x - 36$$

② SET EQUAL TO ZERO AND SOLVE

$$6x^2 + 6x - 36 = 0$$

$$x^2 + x - 6 = 0$$

$$(x+3)(x-2) = 0$$

$$x+3=0 \quad x-2=0$$

$$x = -3 \quad x = 2 \quad \text{C.V.'s}$$

③ FIND SECOND DERIV.

$$y'' = 12x + 6$$

④ PLUG EACH CRITICAL VALUE INTO SECOND DERIV. AND SIMPLIFY

POS	NEG	ZERO
C.V. IS A MIN	C.V. IS A MAX	IT FAILS, DO WHAT YOU DID BEFORE.

$$x = -3$$

$$y'' = 12(-3) + 6$$

$$= -36 + 6$$

NEG

AT $x = -3$ IS REL
MAX

$$y = 2x^3 + 3x^2 - 36x + 12$$

$$y = 2(-3)^3 + 3(-3)^2 - 36(-3) + 12$$

$$= -54 + 27 + 108 + 12$$

$$= -27 + 120$$

$$= 93$$

REL
MAX : $(-3, 93)$

$$x = 2$$

$$y'' = 12(2) + 6$$

POS

AT $x = 2$ IS A MIN

$$y = 2x^3 + 3x^2 - 36x + 12$$

$$y = 2(2)^3 + 3(2)^2 - 36(2) + 12$$

$$= 16 + 12 - 72 + 12$$

$$= 40 - 72$$

$$= -32$$

REL
MIN : $(2, -32)$