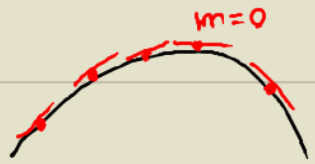

1. $f(x) = 12x - x^3$

$f'(x) = 12 - 3x^2$

$12 - 3x^2 = 0$

$12 = 3x^2$

$\frac{12}{3} = \frac{3x^2}{3}$

$4 = x^2$

$\pm\sqrt{4} = x$

$\pm 2 = x$

FIND INTERVALS OF INCREASING / DECREASING

(1) FIND DERIVATIVE

(2) SET EQUAL TO ZERO AND SOLVE "CRITICAL NUMBERS"

(3) USING CRITICAL NUMBERS, BUILD A TABLE OF INTERVALS, PICK TEST CASES, PLUG THEM INTO DERIVATIVE AND DETERMINE ANSWER

$-\infty$	$x=-2$	$x=2$	∞
$x=-3$	$x=0$	$x=3$	TEST CASES
$12-3x^2$	$12-3x^2$	$12-3x^2$	PLUG INTO DERIV.
$12-3(-3)^2$	$12-3(0)^2$	$12-3(3)^2$	
$12-27$		$12-27$	
-15	12	-15	
DEC	INC	DEC	

DEC $(-\infty, -2)$

INC $(-2, 2)$

DEC $(2, \infty)$

NOTE:

IF NEGATIVE: DECREASING

IF POSITIVE: INCREASING