

"POP" EXERCISE
NYA ELECTRO

①

DETERMINE WHERE THE FUNCTION $f(x) = \frac{x^3}{x^3 - 9x}$ IS INCREASING & WHERE IT IS DECREASING. SHOW YOUR WORK.

SOLUTION.

FIND CRITICAL POINTS





$$f'(x) = \frac{3x^2(x^3 - 9x) - (3x^2 - 9)x^3}{(x^3 - 9x)^2}$$

$$= \frac{3x^5 - 18x^3 - 3x^5 + 9x^3}{(x^3 - 9x)^2}$$

$$= \frac{-9x^3}{(x^3 - 9x)^2}$$

$f'(x)$ DNE WHEN $x=0$
& WHEN $x = \pm 3$

$$= \frac{-9x^3}{[x(x^2 - 9)]^2}$$

INTERVALS	$(-\infty, -3)$	$(-3, 0)$	$(0, 3)$	$(3, \infty)$
TEST PT.	-4	-1	1	4
SIGN OF f'	+	+	-	-
BEHAVIOR OF f	 INCR.	 INCR.	 DECR.	 DECR.

So f is INCREASING FOR x in $(-\infty, 0)$
& DECREASING FOR x in $(0, \infty)$.