

The First Derivative Test is used to:

- Determine the sections of the graph of $f(x)$ that are increasing or decreasing
- Identify extreme values (max/min)

Steps

- Find $f'(x)$
- Identify the critical points (set $f'(x)$ equal to zero and solve for x)
- Set up a table:

Interval	create intervals using the critical points
Test Value	pick a # in each interval
$f'(x) =$	plug each TV into $f'(x)$ to find +/- sign
Inc/Dec	+ INC - DEC

- Draw a rough sketch of the INC/DEC intervals and determining extreme values

ex $f(x) = x^4 - 8x^2 + 1$ $[-4, 1]$

① $f'(x) = 4x^3 - 16x$

② $4x^3 - 16x = 0$

GCF $4x(x^2 - 4) = 0$

DOTS $4x(x+2)(x-2) = 0$

$x = 0$ $x = -2$ $x = 2$

$x = 2$ is not used because it is outside the given interval

③

Int.	$(-4, -2)$	$(-2, 0)$	$(0, 1)$
T.V.	-3	-1	$\frac{1}{2}$
$f'(x) =$	-	+	-
I/D	DEC	INC	DEC

④

