Today's Plan:

Learning Target (standard): I will use the 2nd derivative test to describe the characteristics of a function.

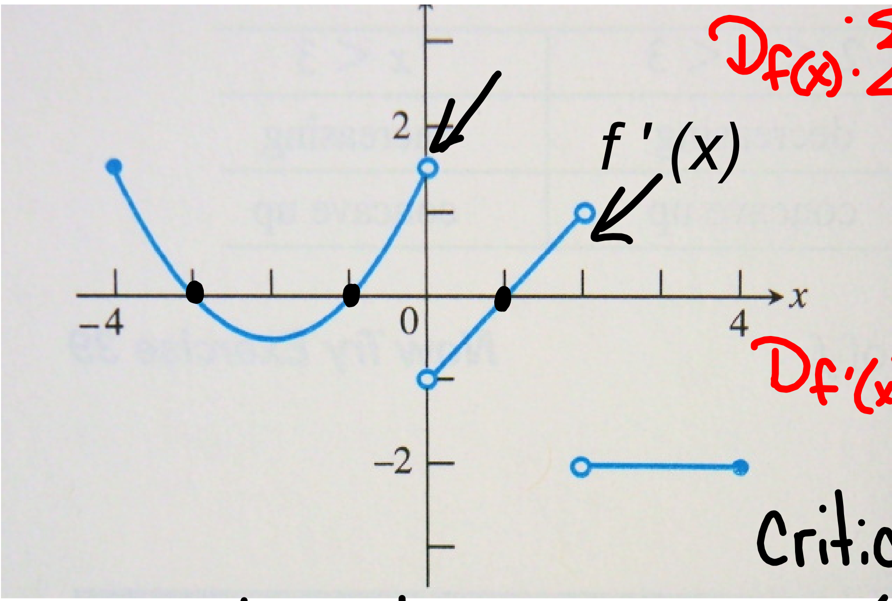
Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

Use the 1st Derivative Test to analyze the function. Sketch a possible *f(x)*.



$D_{f(x)}: \{x \mid -4 \le x \le 4\}$

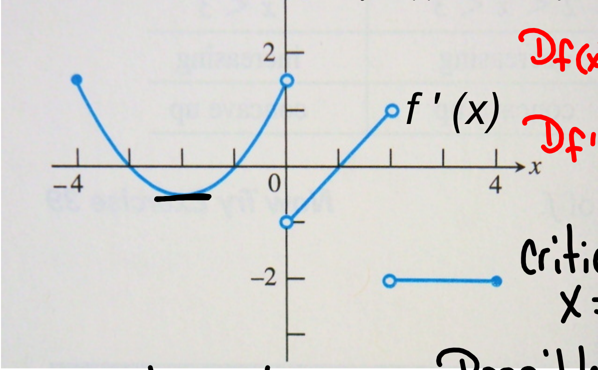
$D_{f'(x)}: \{x \mid -4 \le x \le 4, x \ne 0, 2\}$

Critical #s: $x = -3, -1, 0^*, 1, 2^*$

Domain Interval	f'(x)	f(x)	
(-4,-3)	+	increasing	> max @ x = -3
(-3,-1)	−	decreasing	> min @ x = -1
(-1,0)	+	increasing	> max/cusp @ x = 0
(0,1)	−	decreasing	> min @ x = 1
(1,2)	+	increasing	> max/cusp @ x = 2
(2,4)	−	decreasing	

∴ Since f'(x) goes from positive to negative @ x = -3, f(x) goes from increasing to decreasing @ x = -3 and will have a maximum @ x = -3.

Use the 2nd derivative test to analyze *f(x)*. Sketch a possible *f(x)*.



$D_{f(x)}: \{x \mid -4 \le x \le 4\}$

$D_{f'(x)}: \{x \mid -4 \le x \le 4, x \ne 0, 2\}$

Critical #s:
$x = -3, -1, 0, 1, 2$

Possible POI's:
$x = -2, 0, 2$

Domain Interval	f''(x)	f(x)
(-4, -2)	−	Concave down
(-2, 0)	+	Concave up
(0, 2)	+	Concave up
(2, 4)	0	Constant

> POI @ x = -2

∴ Since f''(x) goes from negative to positive @ x = -2, f(x) goes from concave down to concave up @ x = -2 and will have a point of inflection @ x = -2.

Extremum:

slopes of tangents to f'(x)

$f''(-3) = - < 0$ max @ x = -3

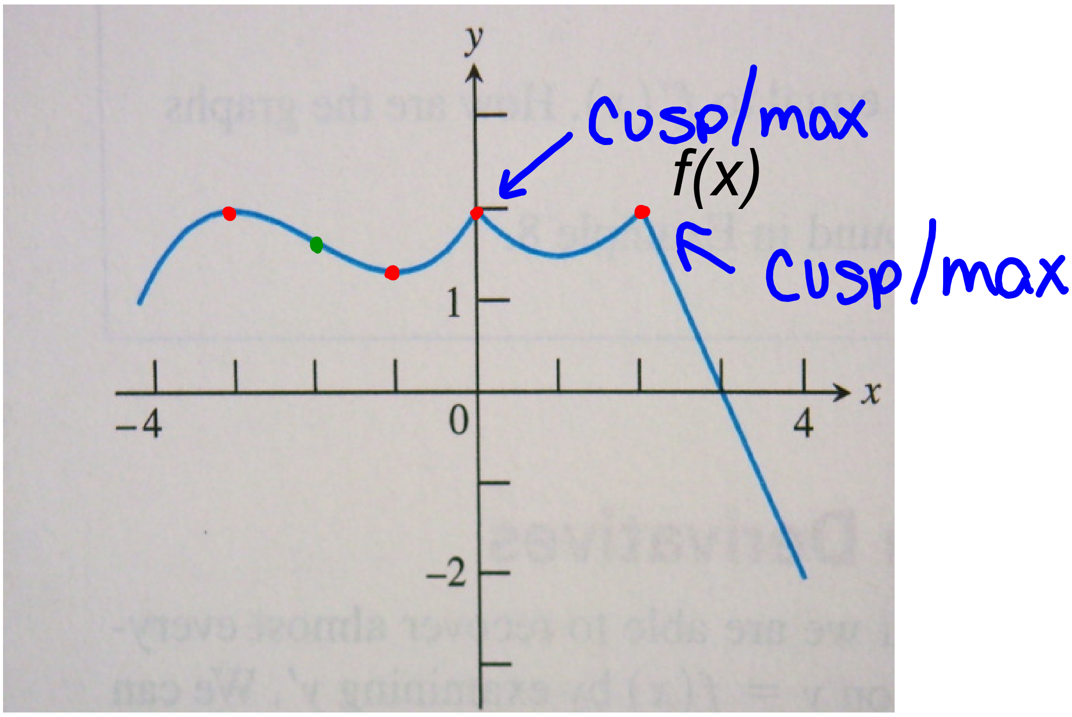
$f''(-1) = + > 0$ min @ x = -1

$f''(0) = ?$ → 1st Derivative Test

$f''(1) = + > 0$ min @ x = 1

$f''(2) = $ und → 1st Derivative Test

∴ Since f''(-3) is negative, f(x) will have a maximum @ x = -3.


y
cusp/max
f(x)
cusp/max
1
x
−4
0
4
−2

Assignment:

- Create the graph of a derivative that has at least 3 zeros and a domain that is NOT the set of real numbers
- Use the 1st Derivative Test to analyze the function
  - create the domain interval chart
  - sketch a possible function
  - describe what the 1st derivative tells about the function
- Use the 2nd Derivative Test to analyze the function
  - create the domain interval chart
  - sketch a possible function
  - describe what the 2nd derivative tells about the function