

**4.3 Connecting  $f'$  and  $f''$  with the Graph of  $f$** 

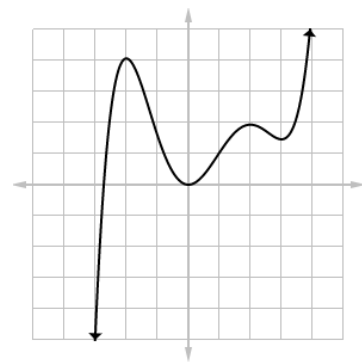
*Example 1:*

Determine the local extreme values of the function and the type of relative extrema and find any inflection points. Check your answer graphically.

$$f(x) = -2x^3 + 6x^2 - 3$$

*Example 2:*

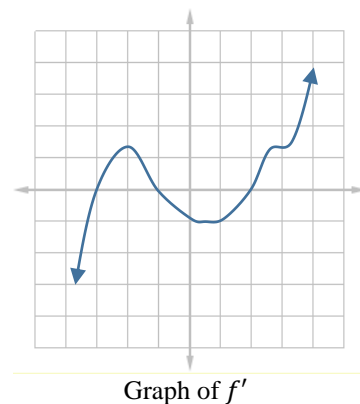
Use the graph of  $f$  to identify where  $f'$  and  $f''$  are positive, negative, and zero.



Graph of  $f$

*Example 3:*

Use the graph of  $f'$  to estimate where  $f$  is increasing and decreasing, where  $f$  has relative extrema, where  $f$  is concave up and concave down, and where  $f$  has inflection points.



Graph of  $f'$

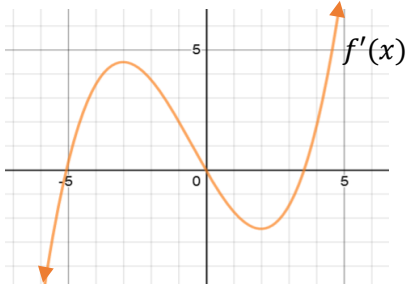
*Example 4:*

The table below gives values of  $f'(x)$  and  $f''(x)$  at selected values of  $x$ . Determine where  $f(x)$  is increasing, decreasing, concave up, concave down and the  $x$ -value(s) of the extrema and the inflection points of  $f(x)$ .

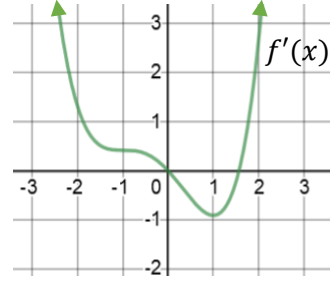
$x$	$(-\infty, -2)$	$-2$	$(-2, 0)$	$0$	$(0, 2)$	$2$	$(2, 3)$	$3$	$(3, \infty)$
$f'(x)$	+	0	+	D N E	-	-	-	0	+
$f''(x)$	-	0	+	D N E	-	0	+	+	+

Given the graph of  $f'(x)$ , describe find where  $f(x)$  is increasing and decreasing and where  $f(x)$  is concave up and concave down.

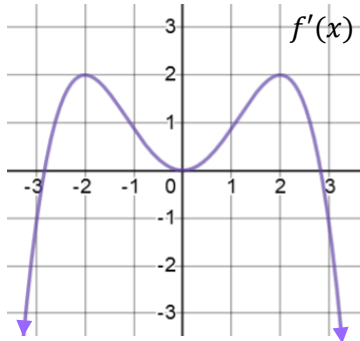
1.



2.



3.



4.

