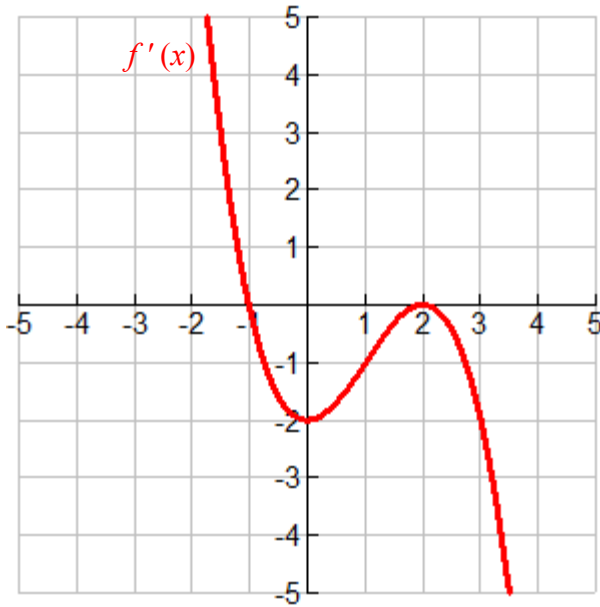
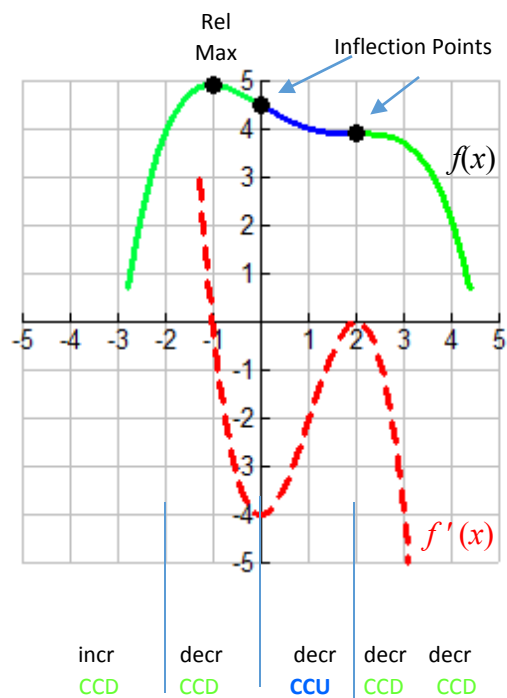
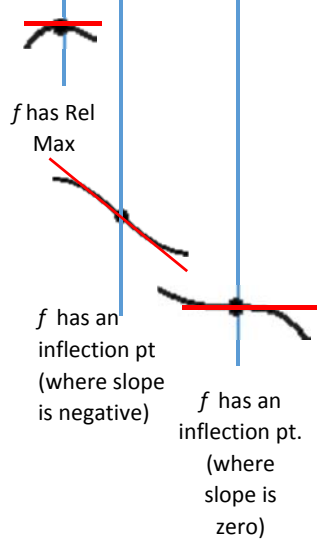


Use the graph of  $f'(x)$  to discuss the graph of  $f(x)$ . Sketch a possible graph of  $f(x)$ .

1.

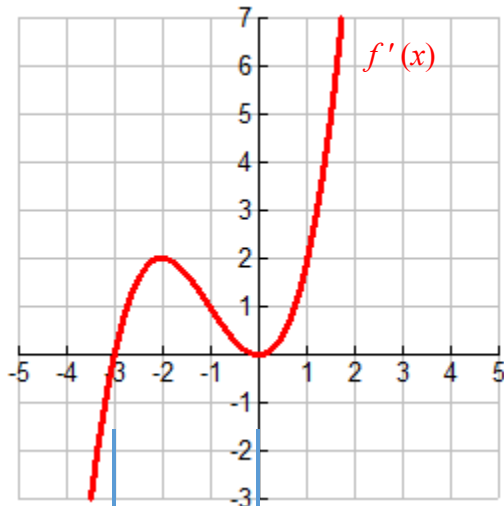


$f''$    -   -   -   0   +   +   0   -   -   -   (This is determined by when the graph of  $f'$  is rising or falling)  
 $f'$    +   +   0   -   -   -   -   0   -   -   -   (This is determined by when the graph of  $f'$  is above or below the x-axis)  
 $f$    incr   incr   decr   decr   decr   decr   decr   decr   (This is determined by the sign of the first derivative)  
 $f$    CCD   CCD   CCD   CCU   CCU   CCD   CCD   CCD   (This is determined by the sign of the second derivative)



Note: any vertical shift of the above graph is also correct. It can be higher or lower than the above graph. Attention was not paid to the accuracy of the slope of the curve. For example, it is not necessary to sketch  $f(x)$  such that the slope at the inflection point at  $x = 0$  is exactly  $-4$ .

2.



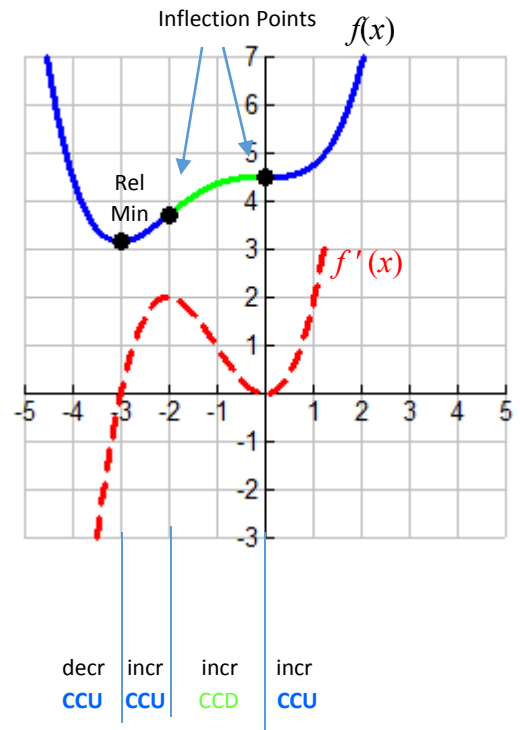
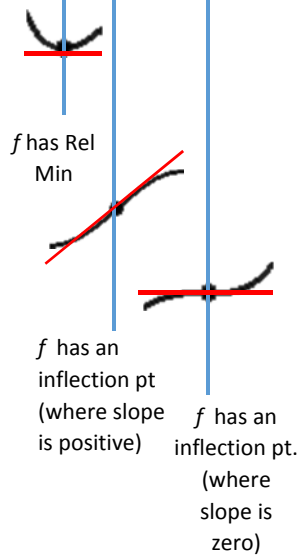
$f''$	+	+	0	-	-	0	+	+
$f'$	-	0	+	+	+	+	0	+
$f$	decr	incr	incr	incr	incr	incr	incr	incr
$f$	CCU	CCU	CCD	CCD	CCU	CCU	CCU	CCU

(This is determined by when the graph of  $f'$  is rising or falling)

(This is determined by when the graph of  $f'$  is above or below the x-axis)

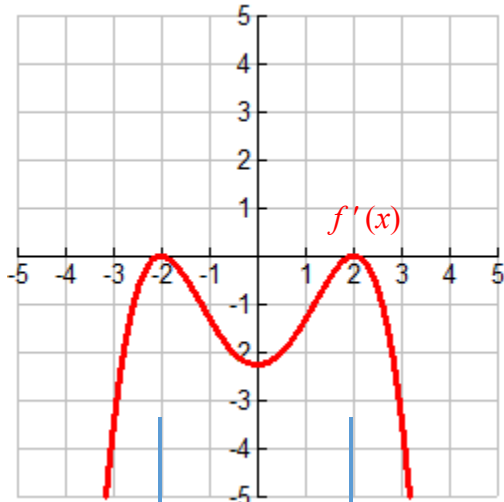
(This is determined by the sign of the first derivative)

(This is determined by the sign of the second derivative)



Note: any vertical shift of the above graph is also correct. It can be higher or lower than the above graph. Attention was not paid to the accuracy of the slope of the curve. For example, it is not necessary to sketch  $f(x)$  such that the slope at the inflection point at  $x = -2$  is exactly 2.

3.



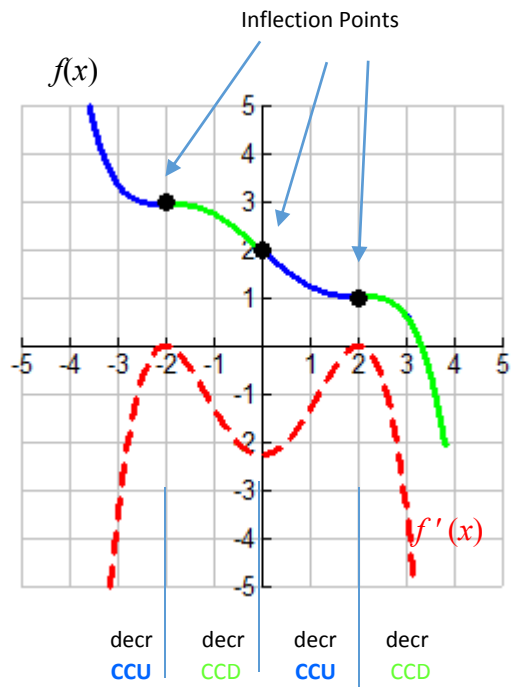
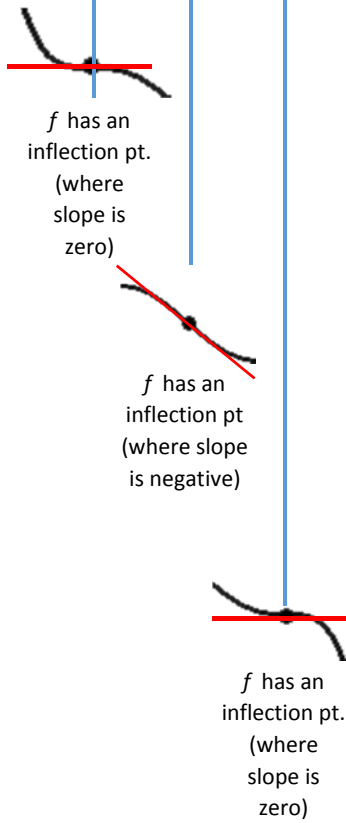
$f''$	+	+	0	-	-	0	+	+	0	-	-
$f'$	-	-	0	-	-	-	-	-	0	-	-
$f$	decr	decr	decr	decr	decr	decr	decr	decr	decr	decr	decr
$f$	CCU	CCU	CCD	CCD	CCU	CCU	CCD	CCD	CCU	CCU	CCD

(This is determined by when the graph of  $f'$  is rising or falling)

(This is determined by when the graph of  $f'$  is above or below the x-axis)

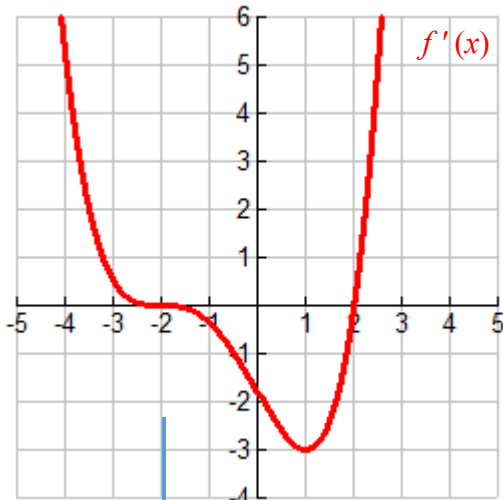
(This is determined by the sign of the first derivative)

(This is determined by the sign of the second derivative)

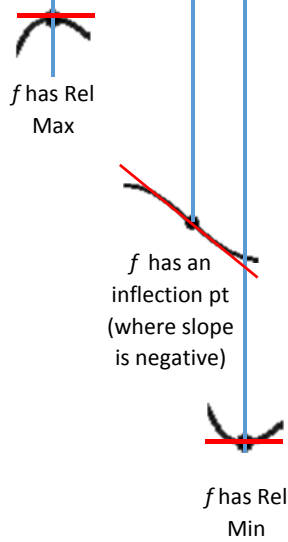


Note: any vertical shift of the above graph is also correct. It can be higher or lower than the above graph. Attention was not paid to the accuracy of the slope of the curve. For example, it is not necessary to sketch  $f(x)$  such that the slope at the inflection point at  $x = 0$  is exactly  $-2.25$ .

4.



$f''$     - - - 0 - - - 0 + + +  
 $f'$     + + 0 - - - - 0 + + +  
 $f$     incr incr decr decr decr decr decr decr  
 $f$     CCD CCD CCD CCD CCD CCU CCU CCU

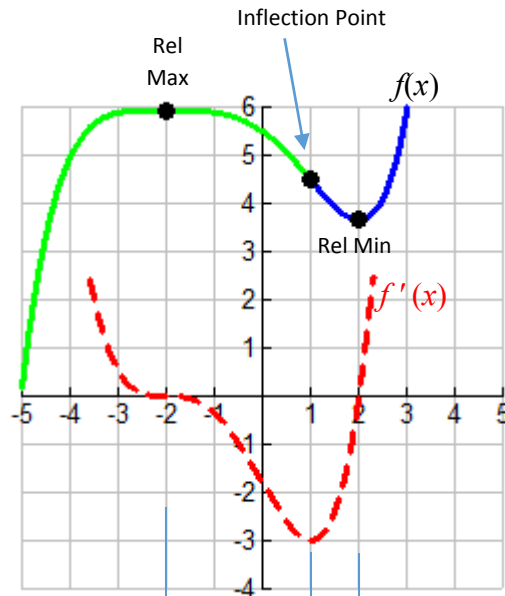


(This is determined by when the graph of  $f'$  is rising or falling)

(This is determined by when the graph of  $f'$  is above or below the  $x$ -axis)

(This is determined by the sign of the first derivative)

(This is determined by the sign of the second derivative)



incr incr incr decr decr decr decr incr  
 CCD CCD CCD CCD CCD CCU CCU

Note: any vertical shift of the above graph is also correct. It can be higher or lower than the above graph. Attention was not paid to the accuracy of the slope of the curve. For example, it is not necessary to sketch  $f(x)$  such that the slope at the inflection point at  $x = 1$  is exactly  $-3$ .