

3.2 Increasing/Decreasing Functions

drag the description to "increasing" or "decreasing"

Increasing

the graph rises from left to right

on an interval for any value of $x_1 < x_2, f(x_1) < f(x_2)$

the slope of the tangent is positive

$$f'(x) > 0$$

Decreasing

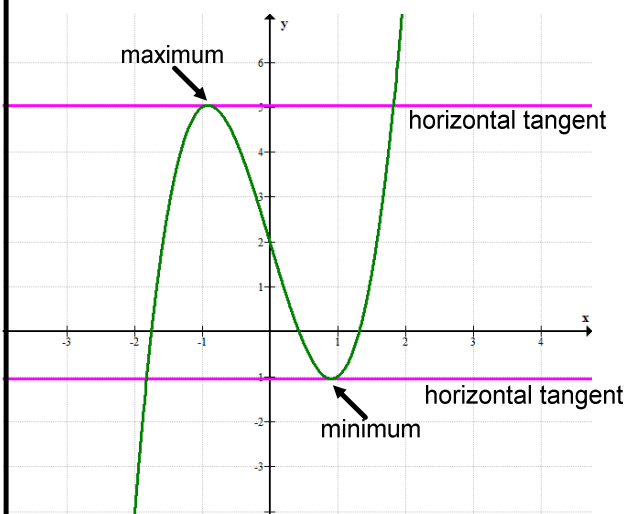
the graph falls from left to right

on an interval for any value of $x_1 < x_2, f(x_1) > f(x_2)$

the slope of the tangent is negative

$$f'(x) < 0$$

Local Extrema:

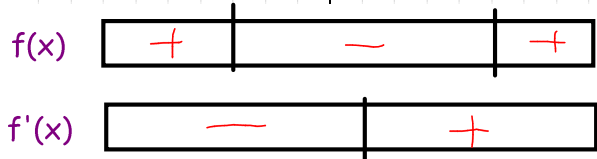
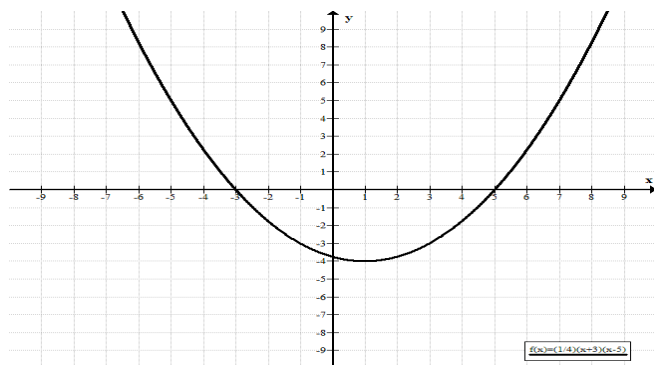


Local Maximum: occurs when $f'(x)$ changes from + to -

Local Minimum: occurs when $f'(x)$ changes from - to +

Ex. 2 Given the graph of $f(x)$, find the intervals where $f(x)$ is increase and decreasing. Prepare a strip for $f(x)$ and $f'(x)$.

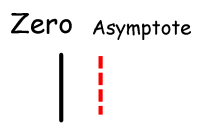
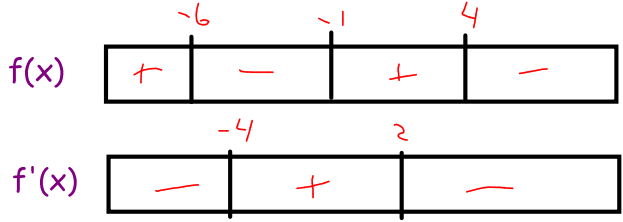
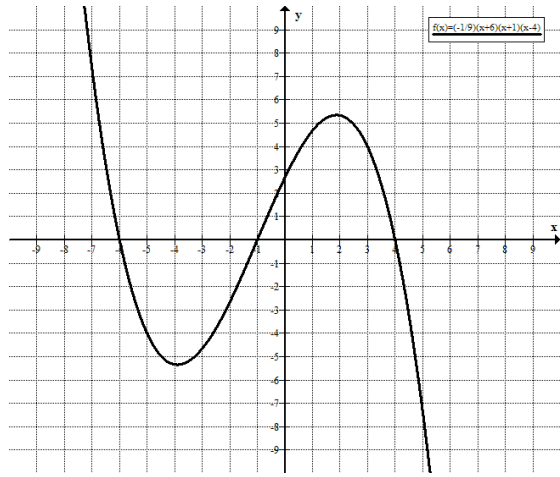
a)



Increasing $(1, \infty)$
 Decreasing $(-\infty, 1)$

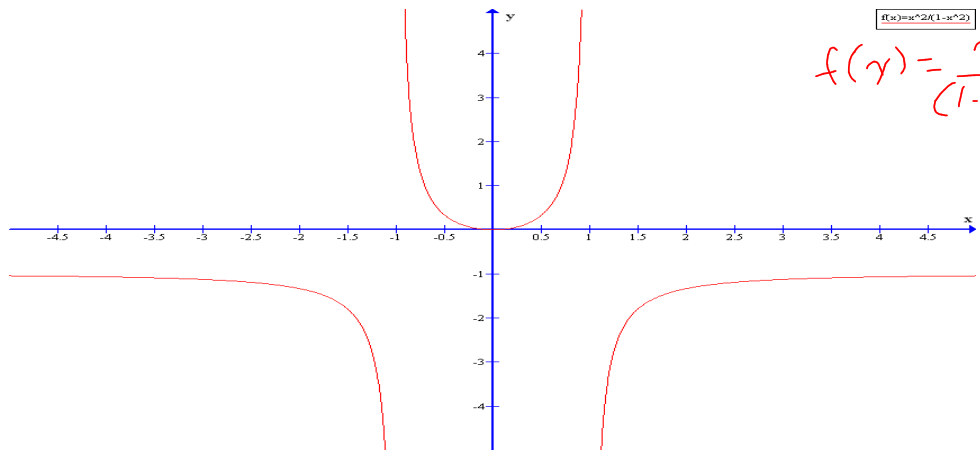
MIN

b)



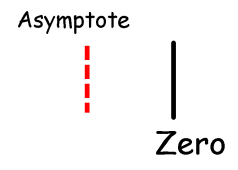
Increasing $(-4, 2)$
 Decreasing $(-\infty, -4) \cup (2, \infty)$

c)

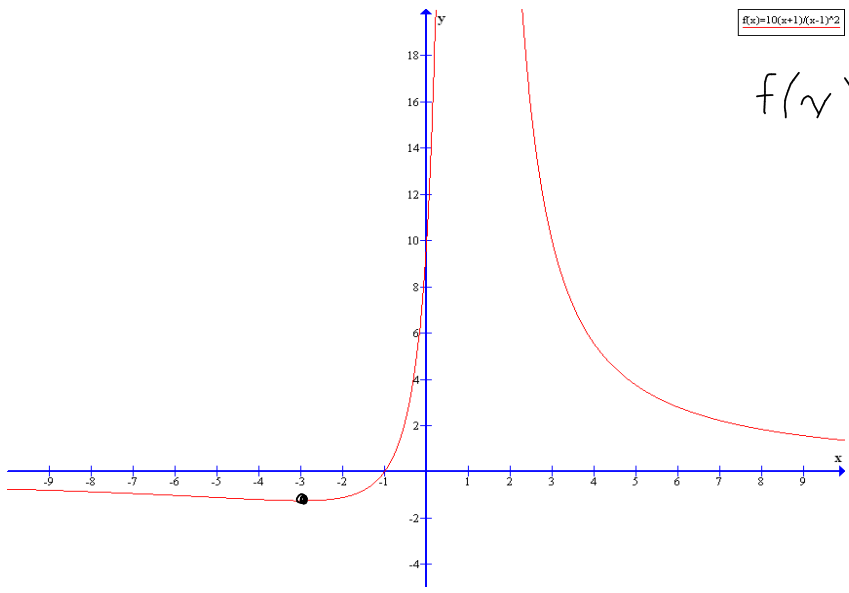


$f(x) = \frac{x^2}{(1-x^2)}$
 Double Root

$f(x)$	-	+	+	-
$f'(x)$	-	-	+	+

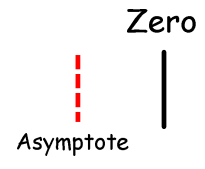


d)



$f(x) = \frac{-10(x+1)}{(x-1)^2}$

$f(x)$	-	+	+
$f'(x)$	-	+	-



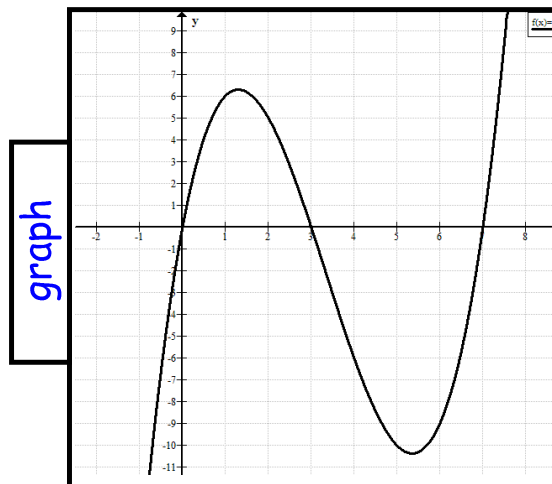
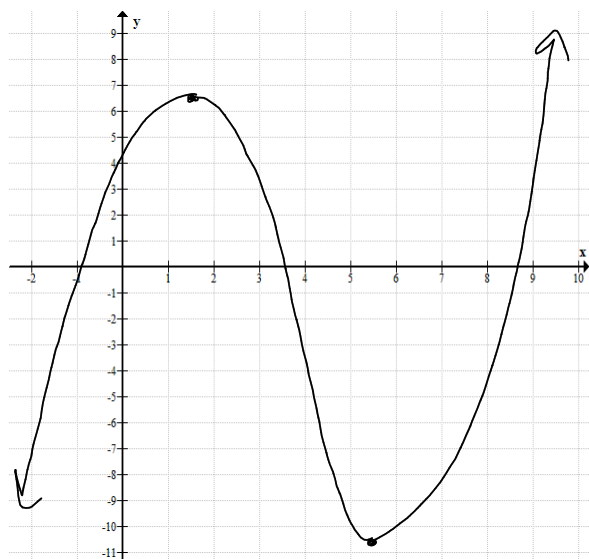
Ex. 3 Sketch a graph that has the following properties.

$$f'(x) > 0 \text{ for } x < 1.4 \text{ and } x > 5.5$$

$$f'(x) < 0 \text{ for } 1.4 < x < 5.5$$

$$f'(1.4) = f'(5.5) = 0$$

$$f(1.4) = 6.4 \text{ and } f(5.5) = -10.4$$



Homework
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