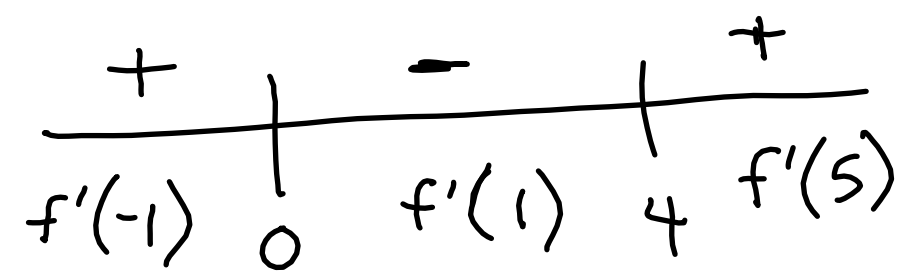


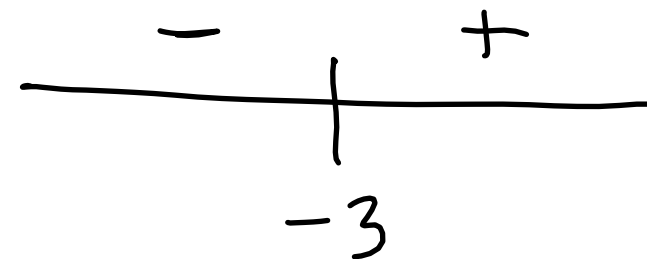
(22) $f(x) = x^3 - 6x^2 + 15$
 $f'(x) = 3x^2 - 12x = 0$
 $3x(x-4) = 0$
 $x = 0, 4$



$f(x)$ is inc on $(-\infty, 0), (4, \infty)$
 dec on $(0, 4)$

rel max @ $x=0$
 rel min @ $x=4$

(32) $f(x) = |x+3| - 1$

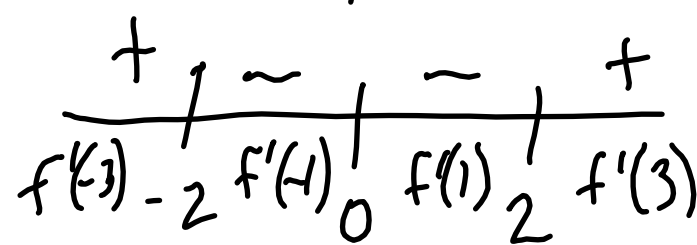


$f(x)$ is dec on $(-\infty, -3)$
 inc on $(-3, \infty)$

(14) $f(x) = x + \left(\frac{4}{x}\right) \rightarrow 4x^{-1}$
 $f'(x) = 1 - 4x^{-2} = 0$

$1 = \frac{4}{x^2}$

$x^2 = 4 \Rightarrow x = \pm 2$, V.A. @ $x=0$
 $f(x)$ inc on $(-\infty, -2), (2, \infty)$



dec on $(-2, 0), (0, 2)$

- concavity \rightarrow curving upward or downward

\rightarrow Let f be differentiable over an open interval. If f' is increasing, then f is concave upward; if f' is decreasing, then f is concave downward

- Since derivatives tell when a function is increasing or decreasing, we need to take the derivative of the 1st derivative, i.e., the 2nd derivative

\rightarrow To test for concavity, let $f''(x)$ exist on an interval

$\rightarrow f''(x) > 0 \rightarrow$ concave up

$\rightarrow f''(x) < 0 \rightarrow$ concave down

- Test is same as using 1st derivative to see where $f(x)$ is increasing or decreasing

Ex $\rightarrow f(x) = x^3(x-4) = x^4 - 4x^3$

$$f'(x) = 4x^3 - 12x^2$$

$$f''(x) = 12x^2 - 24x = 0$$

$$12x(x-2) = 0$$

$$x = 0, 2$$

+		-		+
$f''(-1)$	0	$f''(1)$	2	$f''(3)$

$f(x)$ is
concave up on $(-\infty, 0), (2, \infty)$
concave down on $(0, 2)$

HW: p. 195 \rightarrow 1-25 odd