2.2

Increasing & Decreasing

Inc Dec

function Inc & Dec over x interval

Ex $f(x) = x^3 - 12x - 5$ Inc? dec?

$f'(x) = 3x^2 - 12 = 0$

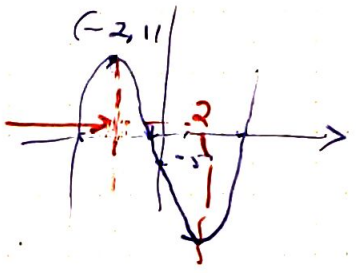
$x^2 = 4 \Rightarrow$ CN: $x = \pm 2$

-2 0 2

$+ \mid - \mid +$

Inc: $(-\infty, 2)$ $(2, \infty)$

Dec: $(-2, 2)$



Ex $f(x) = x^{1/3}(x-4)$

$= x^{4/3} - 4x^{1/3}$

$f'(x) = \frac{4}{3}x^{1/3} - \frac{4}{3}x^{-2/3}$

$= \frac{4}{3}\left(\frac{x-1}{x^{2/3}}\right) = 0$

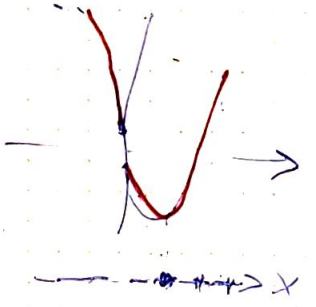
CN: $x = 1, 0$

1 0

$- \mid + \mid +$

Inc: $(1, \infty)$

Dec: $(-\infty, 1)$



extreme points (LMAX, LMIN) Critical points

$x = 1$ or $f(1) = 1(1-4) = -3$

Min point $(1, -3)$

Y.6. $f(x) = x\sqrt{x+1}$

$= x(x+1)^{1/2}$

$f'(x) = \frac{1}{2\sqrt{x+1}} \cdot (x+1+\frac{1}{2}x)$

$= \frac{1}{\sqrt{x+1}} \cdot (\frac{3}{2}x+1) = 0$

CN: $x = -\frac{2}{3}, -1$

$\frac{-2/3 \quad 0}{- \quad | \quad +}$

Naik: $(-\frac{2}{3}, \infty)$

Turun: $(-\infty, -\frac{2}{3})$

Min point: $(-\frac{2}{3}, -\frac{2}{3\sqrt{3}})$

$f(-\frac{2}{3}) = -\frac{2}{3}\sqrt{\frac{4}{3}}$

$= -\frac{2}{3}\sqrt{3}$

Concavities

second derivative $f''(x) = 0$

Point of inflection : pt infl $x = ?$

$f(x) = x^4 - 8x^3 + 18x^2$

$f'(x) = 4x^3 - 24x^2 + 36x$

$f''(x) = 12x^2 - 48x + 36 = 0$

pt. of infl: $x = 1, 3$

concave up (upward)
" down (downward)

0	1	3	
+	-	+	

concave up: $(-\infty, 1)$ $(3, \infty)$
" down: $(1, 3)$

x - abc.
? -