2.

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

① Domain : $(-\infty, \infty)$

② X-INT : $0 = x^4 + 2x^3 - 3x^2 - 4x$

$X = -2.6$
$X = -1$
$X = 0$
$X = 1.6$

③ Y-INT : $y = 0^4 + 2(0)^3 - 3(0)^2 - 4(0)$

$y = 0$

④ VA : NONE

⑤ HA : NONE

⑥ SA : NONE

⑦

$f'(x) = 4x^3 + 6x^2 - 6x - 4$

$4x^3 + 6x^2 - 6x - 4 = 0$

$X = -2$
$X = -\frac{1}{2}$
$X = 1$
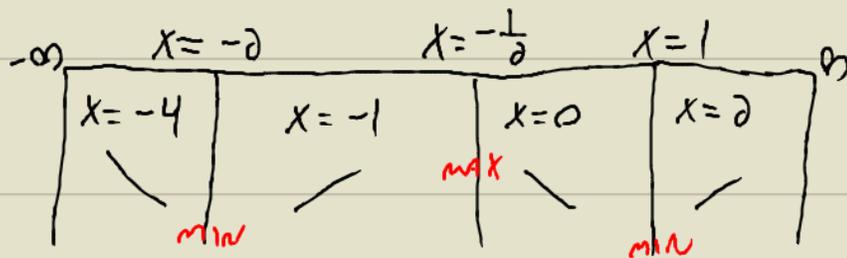
DEC $(-\infty, -2)$
INC $(-2, -\frac{1}{2})$
DEC $(-\frac{1}{2}, 1)$
INC $(1, \infty)$

⑧ RELATIVE EXTREMA

REL MIN $(-2, -4)$
REL MAX $(-\frac{1}{2}, 1.0625) = (-\frac{1}{2}, \frac{17}{16})$
REL MIN $(1, -4)$

⑨ CONCAVITY

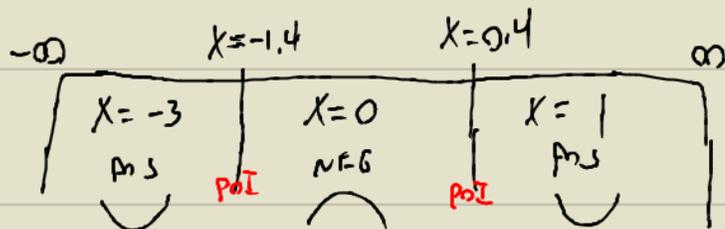$f'(x) = 4x^3 + 6x^2 - 6x - 4$

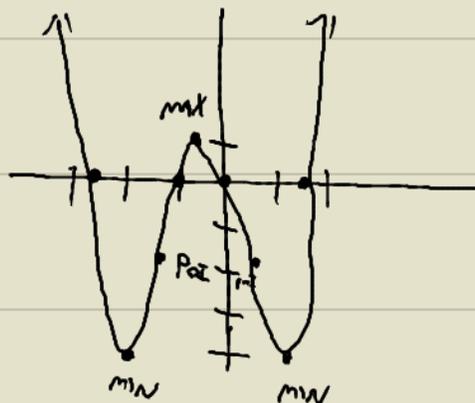$f''(x) = 12x^2 + 12x - 6$

$12x^2 + 12x - 6 = 0$

$6(2x^2 + 2x - 1) = 0$

$X = -1.4$
$X = 0.4$

CONC UP $(-\infty, -1.4)$
CONC DOWN $(-1.4, 0.4)$
CONC UP $(0.4, \infty)$

⑩ POI's

$(-1.4, -1.9)$
$(0.4, -1.9)$

⑪ GRAPH