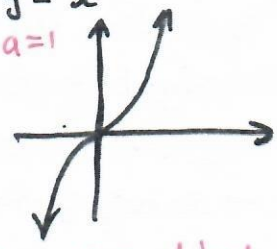
Textbook: Section 1.2 (p. 15)

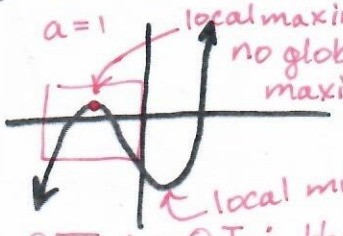
"Investigate 1": (#1) A: Polynomial Functions of Odd Degree

**Group A**

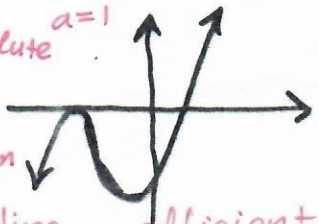
i) $y = x^3$ $a = 1$



ii) $y = x^3 + x^2 - 4x - 4$ $a = 1$



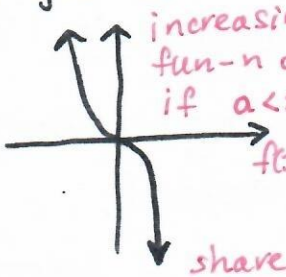

iii) $y = x^3 + 5x^2 + 3x - 9$ $a = 1$



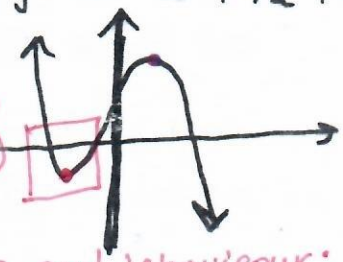
same: end behaviour (opposite); QIII to QI; the leading coefficient $a > 0$

**Group B:**

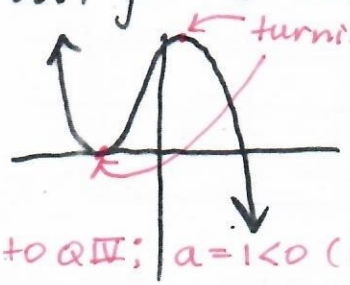
i) $y = -x^3$




ii) $y = -x^3 - x^2 + 4x + 4$



iii) $y = -x^3 - 5x^2 - 3x + 9$




share opposite end behaviour; QII to QIII; $a = -1 < 0$ (leading coeff.)

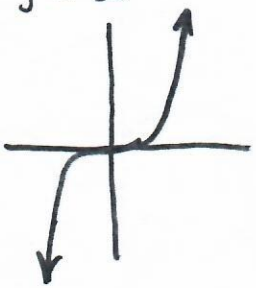
For cubic function: number of turning points (max/min): 0 or 2

number of x-intercepts: 3 at most, (1) at least

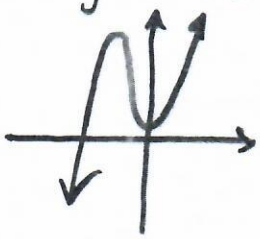
- Does leading coefficient affect end behaviour? yes.

(#2) Quintic Functions

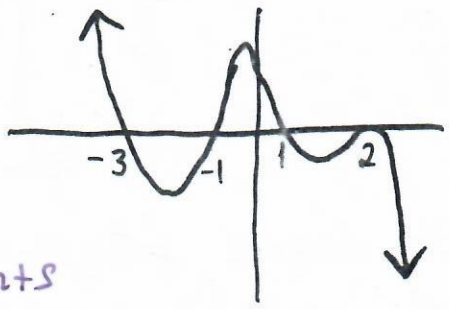
i) $y = x^5$



ii) $y = x^5 + 3x^4 - x^3 + 7x^2 + 4$



iii) $y = -x^5 + x^4 + 9x^3 - 13x^2 - 8x + 12$




For a quintic function:

the number of turning points is 0 or 2 or 4. (even number)

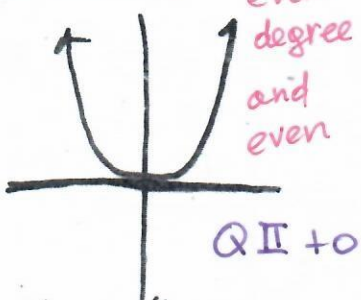
Number of x-intercepts: at least 1, at most 5.

# B: Polynomial Functions of Even Degree

(#1)

## Group A

i)

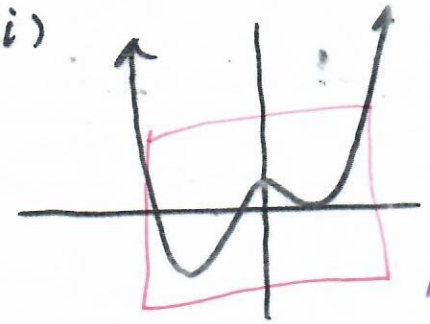


even degree and even

QII to QI

$y = x^4$

ii)



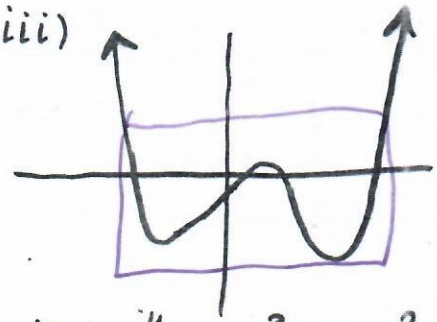
even degree but not even function

← "lopsided W" (unevenly balanced, asymmetrical)

AS. $x \to \pm\infty$, $y \to \infty$

$y = x^4 - x^3 - 6x^2 + 4x + 8$

iii)



$y = x^4 - 3x^3 - 3x^2 + 11x - 4$

number of x-intercepts:

at least 0, at most 4

number of turning points,

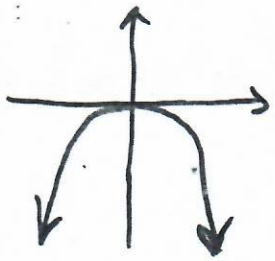
at most 3; at least 1.

for quartic: 1 or 3 turning.

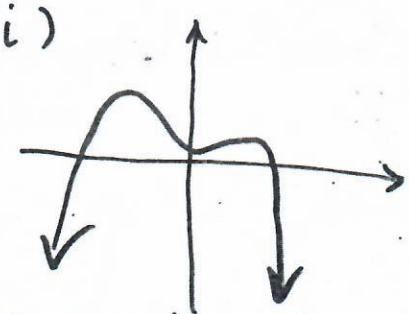
## Group B

$y = -x^4$

i)

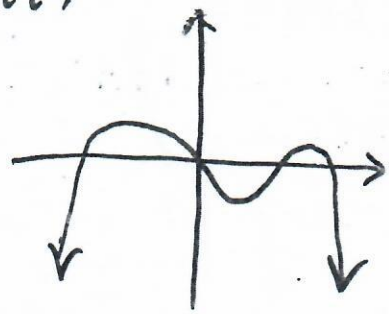


ii)



$y = -x^4 - 5x^3 + 5x + 10$

iii)



$y = -x^4 + 3x^3 + 3x^2 - 11x + 4$

For even degree polynomial fun-n there is an odd number of turning points.

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For a polynomial fun-n of degree n there are at most n x-intercepts.

For an n-degree polynomial function, there are at most n-1 turning points.