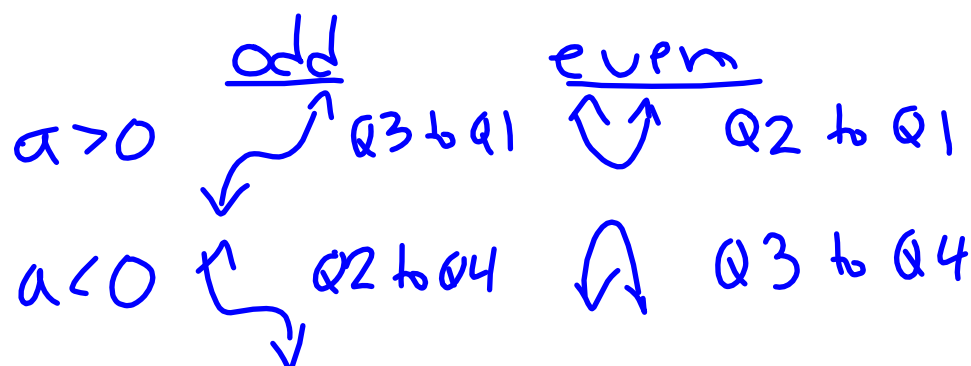


Review - Polynomial Functions

- Properties

- > roots
- > end behaviour
- > finite differences



- Sketching the graph

- Make the equation from the graph \rightarrow zeros (x-int), y-int, end behaviours

- Factoring Sequence

- > Common
- > Grouping
- > "Advanced" Trinomial
- > Quadratics



- Simple Trinomial
- Difference of Squares
- Complex Trinomial

$$\begin{aligned}
 & \underline{x^3 + 2x^2} + \underline{5x + 10} \\
 & x^2(x+2) + 5(x+2) \\
 & (x+2)(x^2+5)
 \end{aligned}$$

- Solving Equations / Using Formulas

$$\begin{aligned}
 & x^4 - 5x^2 + 4 \\
 & a^2 - 5a + 4 \quad \text{let } a = x^2 \\
 & \quad \quad \quad a^2 = x^4
 \end{aligned}$$

Example 1: Determine the degree and leading coefficient of the following function.

x	y
2	10
3	-20
4	-10
5	10
6	10
7	-40

$-20 - (10) = -30$
 $10 - (-20) = 30$
 $-10 - (-20) = 10$
 $10 - (-10) = 20$
 $10 - 10 = 0$
 $-40 - 10 = -50$

40
 10
 -20
 -50

-30
 -30
 -30
 -30

Degree is 3.

$$a \cdot n! = \text{finite diff.}$$

$$a \cdot 3! = -30$$

$$a \cdot \frac{6}{6} = \frac{-30}{6}$$

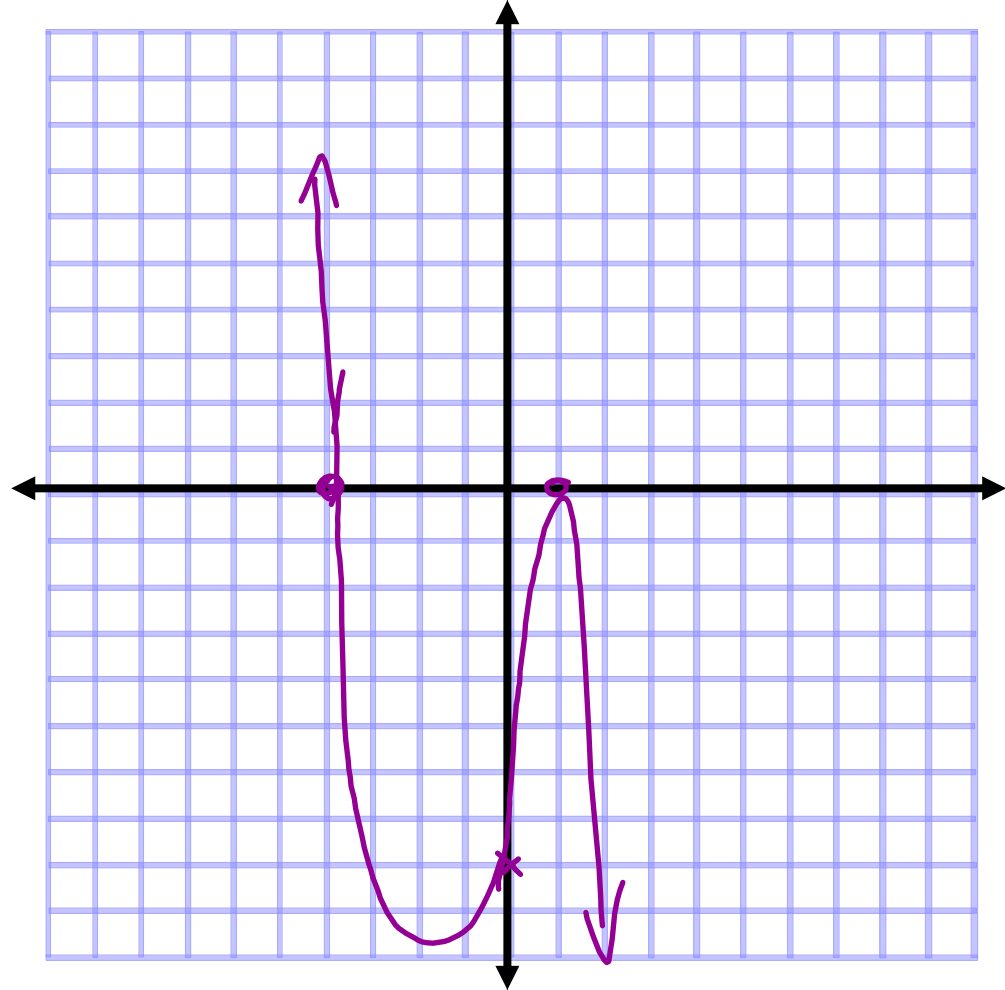
$$a = -5$$

$$y = -5x^3 + \dots$$

Example 2:

a) Sketch the graph of

$$y = -2(x + 4)(x - 1)^2.$$

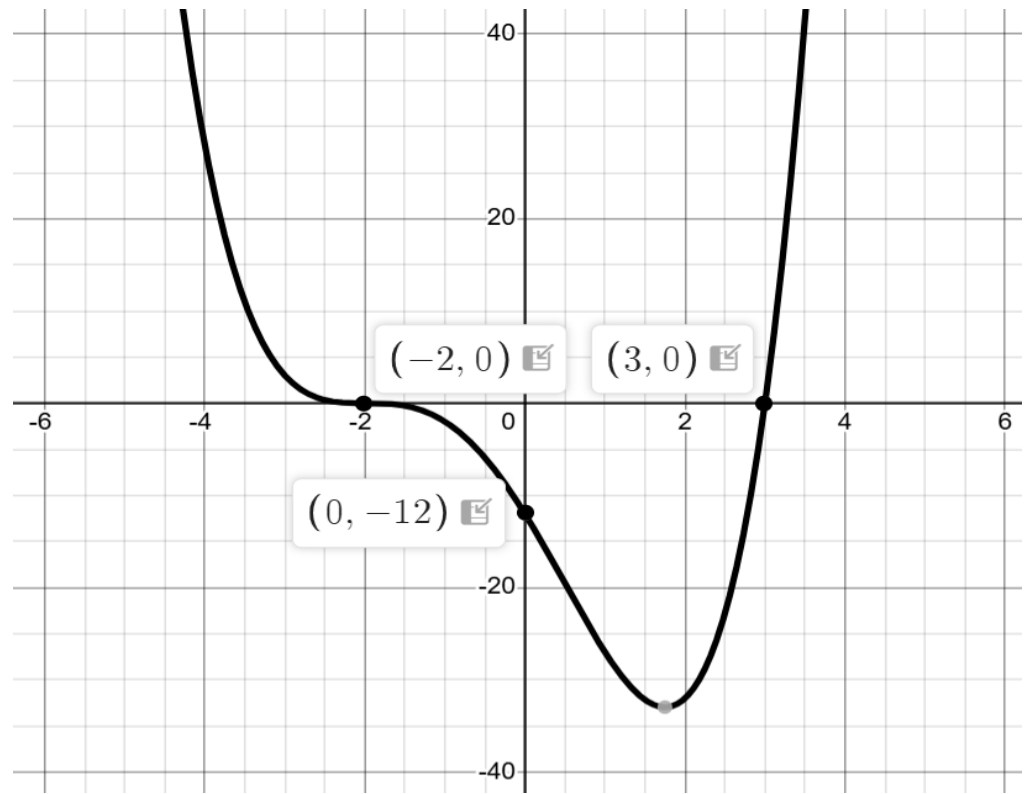


x-int: -4 and 1 (double)

y-int: $y = -2(0+4)(0-1)^2 = -8$
($x=0$)

End Behaviour: Q2 to Q4

b) Determine the equation of the graph shown.



$$y = a(x+2)^3(x-3)$$

$$-12 = a(0+2)^3(0-3)$$

$$-12 = a(8)(-3)$$

$$\frac{-12}{-24} = \frac{-24a}{-24}$$

$$\frac{1}{2} = a$$

$$y = \frac{1}{2}(x+2)^3(x-3)$$

Example 3: Factor.

$$\begin{aligned} \text{a) } x^2 - 9x + 20 & \quad M: 20 \\ & \quad A: -9 \\ & \quad N: -5, -4 \\ & = (x-5)(x-4) \end{aligned}$$

$$\begin{aligned} \text{b) } 4x^2 - 9x + 5 & \quad M: 4 \times 5 = 20 \\ & \quad A: -9 \\ & \quad N: -5, -4 \\ & = 4x^2 - 5x - 4x + 5 \\ & = x(4x-5) - 1(4x-5) \\ & = (4x-5)(x-1) \end{aligned}$$

$$\begin{aligned} \text{c) } 4x^3 + 8x^2 - 9x - 18 & \\ & = 4x^2(x+2) - 9(x+2) \\ & = (x+2)(4x^2 - 9) \\ & = (x+2)(2x-3)(2x+3) \end{aligned}$$

$$\begin{aligned} \text{c) } x^4 - 13x^2 + 36 & \quad \text{Let } a = x^2 \\ & \quad a^2 = (x^2)^2 = x^4 \\ & \quad M: 36 \\ & \quad A: -13 \\ & \quad N: -9, -4 \\ & = a^2 - 13a + 36 \\ & = (a-9)(a-4) \\ & = (x^2-9)(x^2-4) \\ & = (x-3)(x+3)(x-2)(x+2) \end{aligned}$$

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