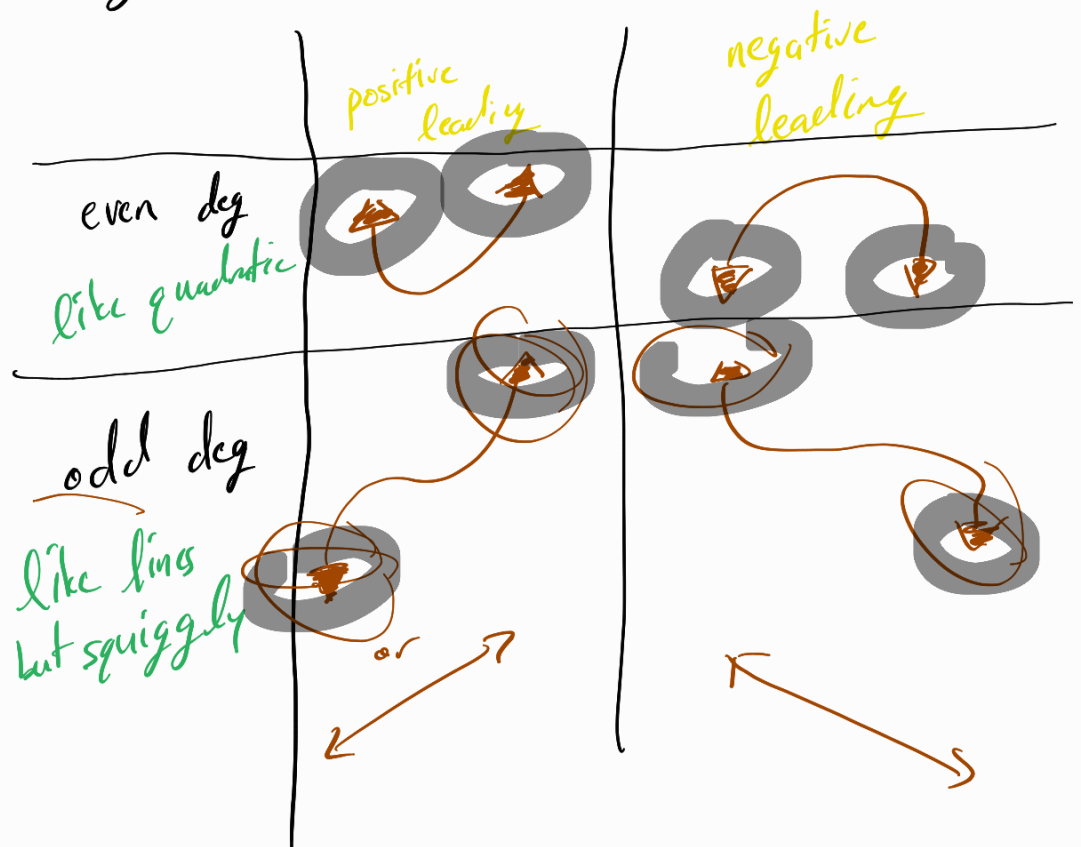


11/14/2023

Polynomials

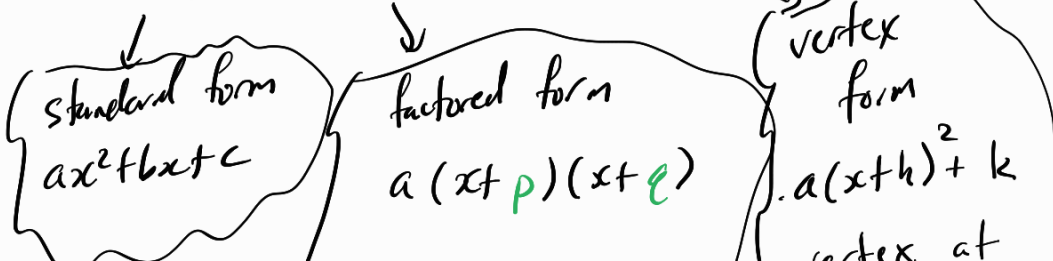
\hookrightarrow <u>degree</u>	<u>leading coefficient</u>
• even or • odd	positive or negative



$$\pi x + 3 - 7x^2 + 2x^4$$

$$\text{deg} = 4, \text{ l.c.} = 2$$

Quadratics



$x = -p, -q$
are x-int

vertex
 $(-h, k)$

Polynomials

Standard form

$$a_0 + a_1x + a_2x^2 + a_3x^3 + \dots + a_nx^n$$

is the definition of polynomial

- get the degree n
- leading coeff

FOIL · FOIL
FOIL

Factored form

$$a(x-r_1)(x-r_2)(x-r_3)\dots(x-r_n)$$

all multiplication!!

- gives x-intercepts

$$f(x) = (x-1)(x-2)(x-3)^2(x-5)^{15}(x+4)^3$$

find all x-int

$$x-1=0 \Rightarrow$$

$$x-2=0 \Rightarrow$$

$$x-3=0 \Rightarrow$$

$$x-5=0 \Rightarrow$$

$$x+4=0 \Rightarrow$$

x-int	multiplicity	# of repeats
$x=1$	1	1
$x=2$	1	1
$x=3$	2	2
$x=5$	15	15
$x=-4$	3	3

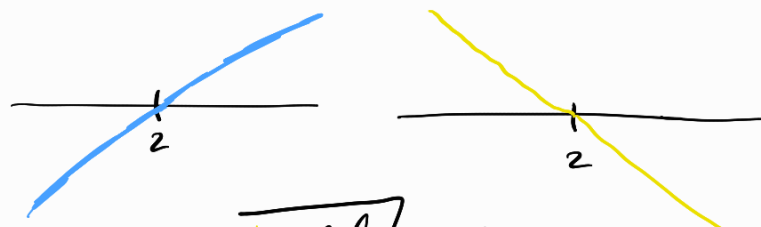
Find y-int: set $x=0$

$$f(x) = a(x-1)(x-2)(x-3)^2(x-5)^{15}(x+4)^3$$

$$f(0) = (-1)(-2)(-3)(-5)(4)$$

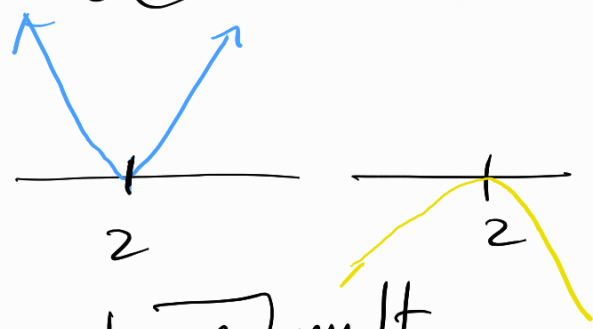
$$f(x) = (x-1)(x-2)(x-3)(x-5)(x+4)$$

$x=2$ is x-int



odd mult
Cross the x-axis

$x=2$ is x-int



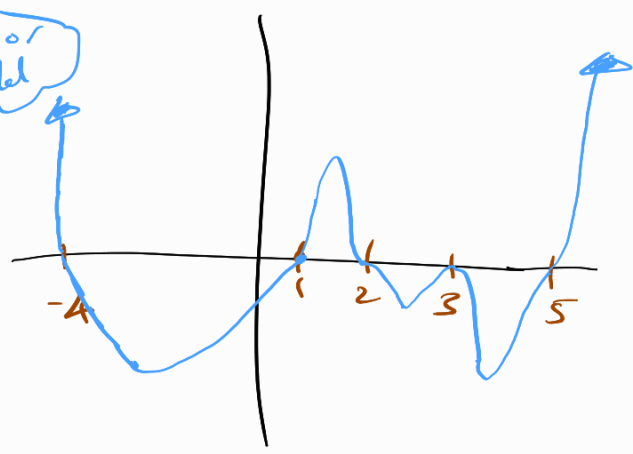
even mult
bounce off the x-axis

✓ pos. leading coeff

$$f(x) = 1(x-1)(x-2)(x-3)^2(x-5)^{15}(x+4)^3$$

x-int	multiplicity
$x=1$	1
$x=2$	1
$x=3$	2
$x=5$	15
$x=-4$	3

even or odd



$$\begin{aligned} \deg &= 1+1+2+15+3 \\ &= 22 \\ &\text{even} \end{aligned}$$

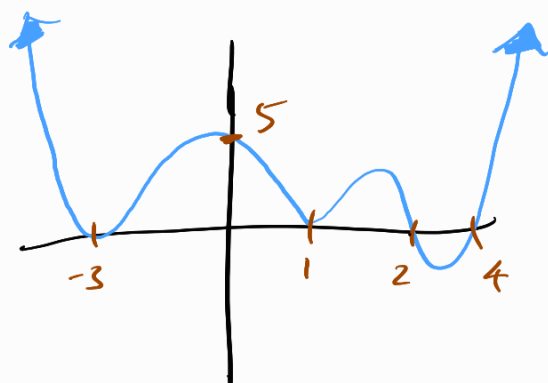
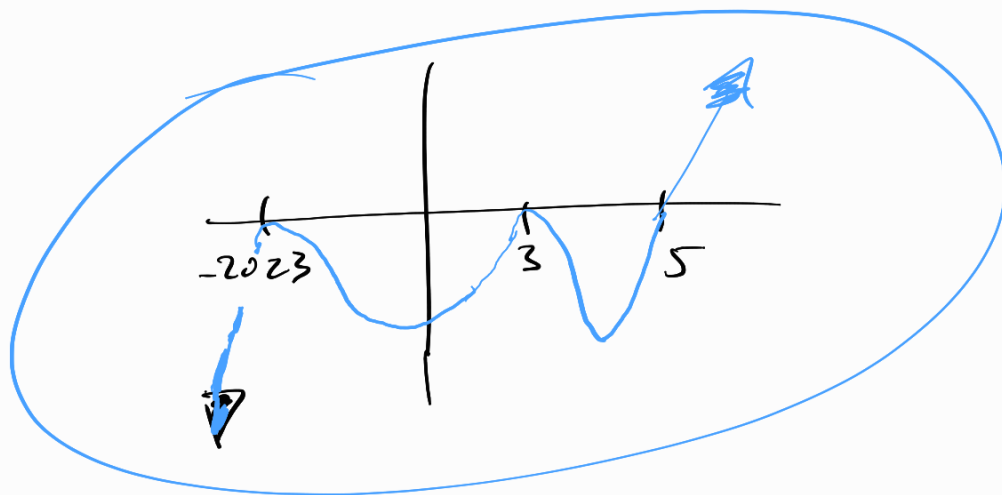
Try graphing

$$f(x) = 2(x-5)^{15}(x-3)^2(x+2023)^4$$

use x -int & mult !!

x -int: 5, 3, -2023

mult: $\hat{1}$ $\hat{1}$ $\hat{1}$ \Rightarrow 21 odd



give a function
equation for
the curve

simplest answer:

(1) look @ x -int: $x = -3, 1, 2, 4$

(2) even/odd mult: $\hat{1}$ $\hat{1}$ $\hat{1}$ $\hat{1}$
2 2 1 1

{ pick smallest positive
even or odd

(3) write in FACTORED form:

$$f(x) = \underline{a(x+3)^2(x-1)^2(x-2)(x-4)}$$

(4) 1 1

① solve for a

$$f(0) = 5$$

$$f(0) = a(3)^2(-1)^2(-2)(-4) = 5$$

$$\Rightarrow a = \frac{5}{3^2 \cdot 8} = \frac{5}{72}$$

⑤ final answer:

$$\frac{5}{72} (x+3)^2 (x-1)^2 (x-2)(x-4)$$