

11/14/2023

Quadratics

STANDARD

$$3 + 2x - 3x^2$$

$$a > 0 \quad \uparrow \uparrow$$

$$a < 0 \quad \downarrow \downarrow$$

Vertex form

$$-\frac{2}{3}(x+4)^2 - 11$$

vertex:

$$(-4, -11)$$

FACTORED

$$3(x+5)(x-2)$$

x-int:

$$x = -5, 2$$

$$(-5, 0), (2, 0)$$

$$x = -b/2a$$

$$y = f(-b/2a)$$

Polynomials

Today

Standard form

- degree

- leading coeff

most of
ch

Factored forms

- x-int, multiplicity

FOIL

Factored form:

$$f(x) = (x-5)^3(x+2)^2(x-3)^4(x+20)$$

x -int

$$x-5=0 \leadsto$$

x -int

$$x=5$$

multiplicity \leftarrow # of repeats

3

odd

$$x+2=0 \leadsto$$

$$x=-2$$

2

even

$$x-3=0 \leadsto$$

$$x=3$$

4

even

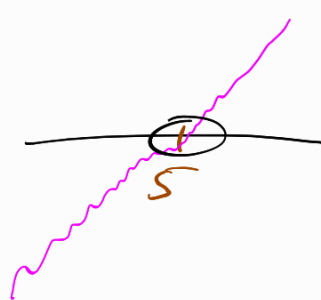
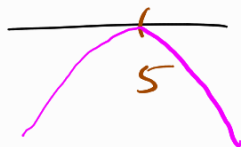
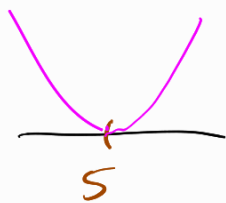
$$x+20=0 \leadsto$$

$$x=-20$$

1

odd

" $x=5$ is x -int"



even multiplicity

odd multiplicity

bounce off x -axis

cross that pt

$$f(x) = (x-5)^3(x+2)^2(x-3)^4(x+20)$$

x -int

$$x-5=0 \leadsto$$

x -int

$$x=5$$

multiplicity

3

odd

$$x+2=0 \leadsto$$

$$x=-2$$

2

even

$$x-3=0 \leadsto$$

$$x=3$$

4

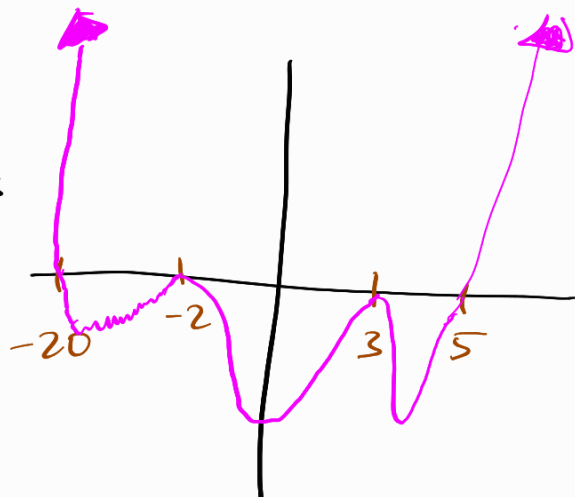
even

$$x+20=0 \leadsto$$

$$x=-20$$

1

odd

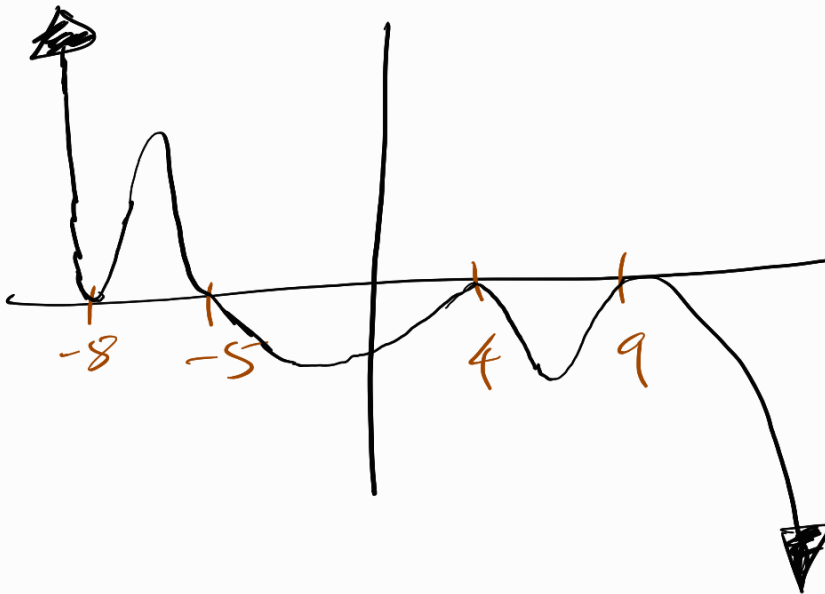


$$\deg = 3+2+4+1$$

$$f(x) = -2 \underbrace{(x-9)^6}_{\substack{\uparrow \\ \text{leading coeff}}} \underbrace{(x+8)^8}_{\substack{\uparrow \\ \text{degree}}} \underbrace{(x-4)^4}_{\substack{\uparrow \\ \text{degree}}} \underbrace{(x+5)}_{\substack{\uparrow \\ \text{degree}}}$$

6 + 8 + 4 + 1 = 19

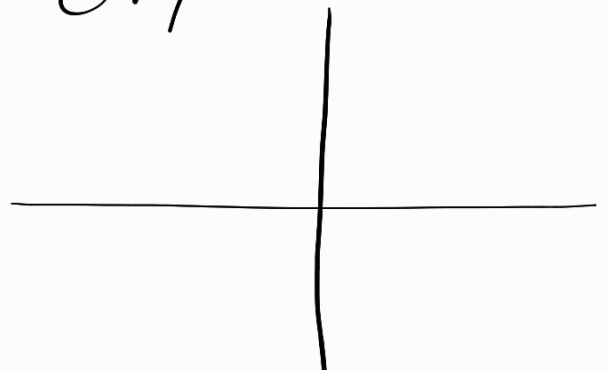
<u>x-int</u>	$x = 9$	-8	4	-5
<u>multiplicity</u>	6	8	4	1

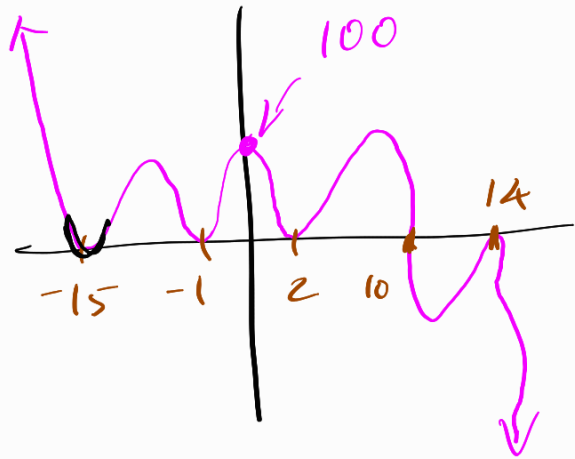
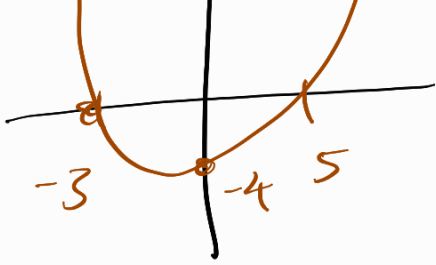


Try: $f(x) = 3(x-17)^{2020}(x+2023)^3$

x-int
mult

Graph





Q: give a formula
for

① use x-int & mult!

$$f(x) = a (x+15)^2 (x+1)^2 (x-2)^2 (x-10)^1 (x-14)^2$$

② solve for a (0, 100)

$$f(0) = 100$$

$$f(x) = a (x+15)^2 (x+1)^2 (x-2)^2 (x-10)^1 (x-14)^2$$

$$= a \cdot 15^2 \cdot 1^2 \cdot (-2)^2 \cdot (-10)^1 \cdot (-14)^2 = 100$$

$$\Rightarrow a = \frac{100}{15^2 \cdot 4 \cdot (-10) \cdot (-14)}$$

$$f(x) = \frac{100 \cdot (x+15)^2 (x+1)^2 (x-2)^2 (x-10)}{15^2 (4) (-10) (-14)^2 (x-14)^2}$$