Linear Factorization Form (LFF)

↳ f(x) = product of linear terms

ex. $f(x) = (x-1)(x+4)$

ex. $f(x) = (x-1)^3(x-2)^2(x+1)$

ex. $f(x) = x^2(x-1)^3(x-4)$

~~ex.~~ $f(x) = (x-2)(x^2+4)$

↳ $x^2 = -4$, $x = \pm 2i$

ex. $f(x) = (x-2)(x-2i)(x+2i)$

↑ LFF

zeros: $x = 2, 2i, -2i$

To place a function into LFF or find all ~~real~~ zeros:

1) Factor 1ST!
   ex. $y = x^4 + 6x^2 + 8$
2) If you can not factor...
   Calc → Stcal {1} zero... choose wisely
3) Synthetic Div...
   factor / solve the remaining funct.

Ex. Place into LFF... $f(x) = x^3 - 12x^2 + 40x - 24$

	x^3			
6	1	−12	40	−24
		6	−36	24
	x^2 1	−6	4	0

$= (x-6)(x^2-6x+4)$

$x = \frac{+6 \pm \sqrt{36-4(1)(4)}}{2}$

$x = \frac{6 \pm 2\sqrt{5}}{2} = 3 \pm \sqrt{5}$

$f(x) = (x-6)(x-3-\sqrt{5})(x-3+\sqrt{5})$

Ex. Place into LFF and find all real zeros for $f(x) = 2x^4 + x^3 - 33x^2 + 56x - 20$

$x = 2$ → "touching" x-axis
↳ even multiplicity → smallest even # → 2

2	x^4 2	1	−33	56	−20
		4	10	−46	−20
	x^3 2	5	−23	10	0

2	x^3 2	5	−23	10
		4	18	−10
	x^2 2	9	−5	0

$y = (x-2)^2(2x^2+9x-5)$

LFF $y = (x-2)^2(2x-1)(x+5)$

ALL zeros: $x = 2, \frac{1}{2}, -5$

Be careful with calculators!!! Examine $f(x) = x^3 + 4.9x^2 - 126x + 382.5$