

5.2 POLYNOMIALS AND LINEAR FACTORS

RECALL: $x^2 - 7x + 12 = (x-3)(x-4)$

↓
STANDARD FORM

↘ FACTORED FORM

EX: WRITE $(x+1)(x-2)(x+3)$ IN STANDARD FORM.

$$\begin{aligned}(x+1)(x-2)(x+3) &= (x^2 - 2x + x - 2)(x+3) \\ &= (x^2 - x - 2)(x+3)\end{aligned}$$

$$= x^3 + 3x^2 - x^2 - 3x - 2x - 6$$

$$= x^3 + 2x^2 - 5x - 6$$

HOW HARD WOULD IT BE TO FACTOR
 $x^3 + 2x^2 - 5x - 6$?

EX: FACTOR $3x^3 - 18x^2 + 24x$

$$3x(x^2 - 6x + 4)$$

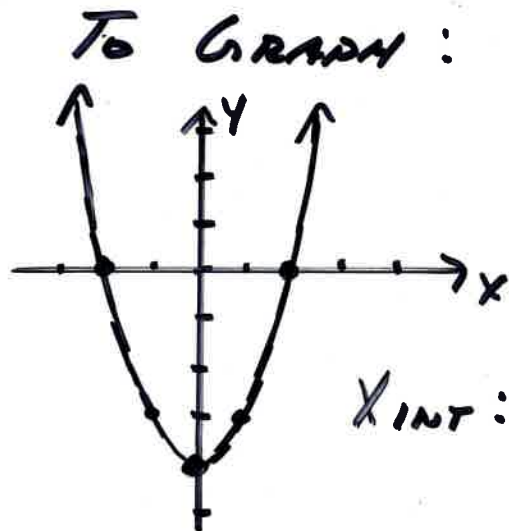
$$3x(x-4)(x-2)$$

CONSIDER $x^2 - 4 = 0$

TO SOLVE:
 $x^2 - 4 = 0$

$$(x-2)(x+2) = 0$$

$$x = 2, -2$$



-2 IS A SOLUTION TO $x^2 - 4 = 0$

-2 IS AN X-INTERCEPT OF $y = x^2 - 4$

-2 IS A ZERO OF $y = x^2 - 4$

$(x+2)$ IS A FACTOR OF $x^2 - 4$

EX: WRITE A POLYNOMIAL FUNCTION
WITH ZEROS AT -2, 3, -1.

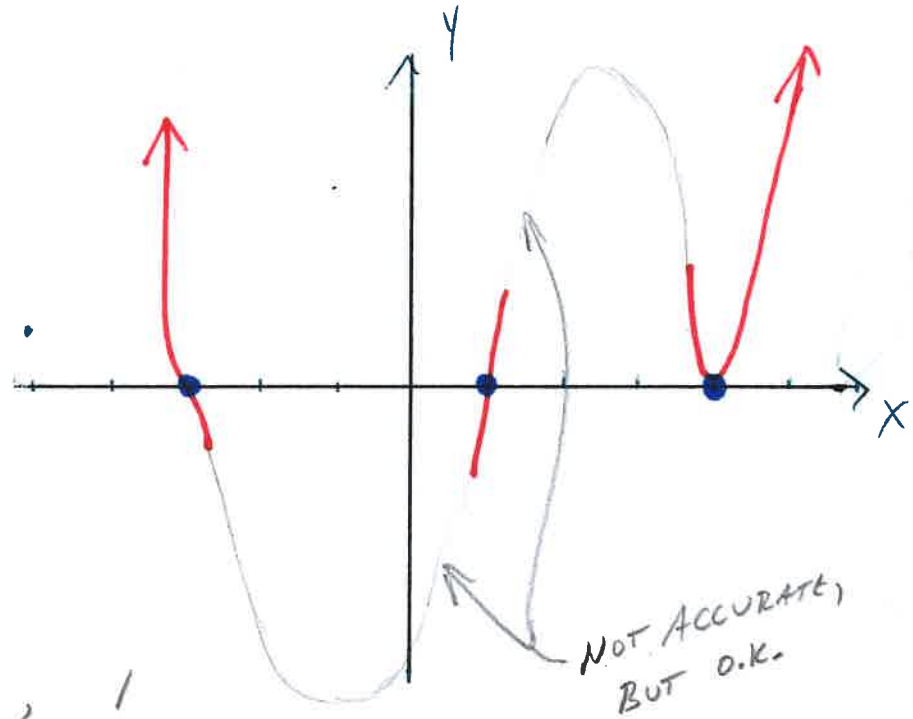
$$f(x) = (x+2)(x-3)(x+1)$$

$$= (x^2 - x - 6)(x+1)$$

$$= x^3 + x^2 - x^2 - x - 6x - 6$$

$$f(x) = x^3 - 7x - 6$$

Ex/ GRAPH $f(x) = (x-4)^2(x+3)^3(x-1)$



X INT: 4, -3, 1

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

Bounce
@ $x=4$

"WIGGLE"
@ $x=-3$

STRAIGHT
THROUGH
AT
 $x=1$

END BEHAVIOR

FOR $y = 1x^6 + \dots$



ROOTS: 4 (MULTIPLICITY OF 2)

-3 (MULT OF 3)

1

NOTE:
WE CANNOT FIND
THE MAX/MIN
WITHOUT CALCULUS.