

Ex 1

$$f(x) = 6x^3 + 17x^2 - 63x + 10$$

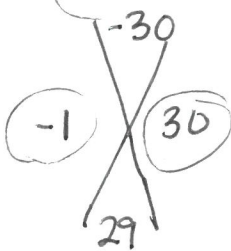
hint:  $f(2) = 0$

$$(x-2)$$

$$\begin{array}{r}
 2 \overline{) 6 \quad 17 \quad -63 \quad 10} \\
 \underline{12 \quad 58 \quad -10} \\
 6 \quad 29 \quad -5 \quad 0
 \end{array}$$

$$6x^3 + 17x^2 - 63x + 10 = \underbrace{(6x^2 + 29x - 5)}_{\text{factor?}}(x-2) + 0$$

$$6x^2 + 29x - 5 = (x+5)(6x-1)$$



	$x$	$5$
$6x$	$6x^2$	$30x$
$-1$	$-x$	$-5$

Complete factorization

$$6x^3 + 17x^2 - 63x + 10 = (x-2)(x+5)(6x-1)$$

Ex1 part 2

$$6x^2 + 29x - 5$$

$$x = \frac{-29 \pm \sqrt{29^2 - 4 \cdot 6 \cdot (-5)}}{2 \cdot 6} = \frac{-29 \pm \sqrt{961}}{12} = \frac{-29 \pm 31}{12}$$

$$\frac{-29-31}{12} = \frac{-60}{12} = -5 \quad ; \quad \frac{-29+31}{12} = \frac{2}{12} = \frac{1}{6}$$

$$6x^3 + 17x^2 - 63x + 10 = (x-2)(x-5)\left(x-\frac{1}{6}\right) \cdot 6$$

Ex 2

$$f(x) = 3x^3 - 11x^2 + 8x + 4$$

$$f(2) = 0$$

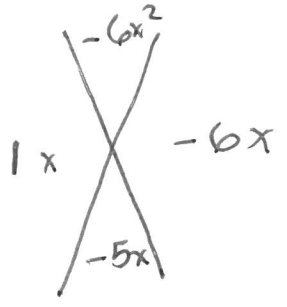
$$\begin{array}{r} 2 \overline{) 3 \quad -11 \quad 8 \quad 4} \\ \underline{6 \quad -10 \quad -4} \\ 3 \quad -5 \quad -2 \quad 0 \end{array}$$

$$3x^3 - 11x^2 + 8x + 4$$

$$f(x) = (3x^2 - 5x - 2)(x - 2) =$$

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

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



	$x$	$-2$
$3x$	$3x^2$	$-6x$
$1$	$+1x$	$-2$



Ex 3  $f(x) = x^3 + 3x^2 + 4x + 12$   $f(3) = 0$

$$f(x) = x^3 - 5x^2 + 5x + 3 \quad f(3) = 0$$

$$\begin{array}{r|rrrr} 3 & 1 & -5 & 5 & 3 \\ & & 3 & -6 & -3 \\ \hline & 1 & -2 & -1 & 0 \end{array}$$

$$(x - 3)(x^2 - 2x - 1)$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4 \cdot 1 \cdot (-1)}}{2 \cdot 1}$$

$$= \frac{2 \pm \sqrt{4+4}}{2}$$

$$= \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2}$$

$$= \frac{2}{2} \pm \frac{2\sqrt{2}}{2}$$

$$= 1 \pm \sqrt{2}$$

$$1 + \sqrt{2}$$

$$f(x) =$$

$$(x-3)(x-(1+\sqrt{2}))(x-(1-\sqrt{2}))$$

$$= (x-3)(x-1-\sqrt{2})(x-1+\sqrt{2})$$

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$$f(x) = 15x^3 + 61x^2 + 2x - 8 =$$

$$(ax + b)(x)(x)$$

zero

$$ax + b$$

$$x = -b/a$$

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List all of the possible rational zeros

$$x = \frac{\text{factor of } 8}{\text{factor of } 15}$$

$$\begin{array}{l} -\frac{1}{1}, -\frac{2}{1}, -\frac{4}{1}, -\frac{8}{1}, -\frac{1}{3}, -\frac{1}{5}, -\frac{1}{15} \\ -\frac{2}{3}, -\frac{2}{5}, -\frac{2}{15} \\ -\frac{4}{3}, -\frac{4}{5}, -\frac{4}{15} \\ -\frac{8}{3}, -\frac{8}{5}, -\frac{8}{15} \end{array}$$

44.  $f(x) = (x+1)^2 (x-1)^3 (x^2-10)$

zeros

multiplicity

$x = -1$

2

$x = 1$



3

$x^2 - 10 = 0$

$x^2 = 10$

$x = \pm\sqrt{10}$



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HW

3.3 # 17, 19, 21, 35a, 39a, 43, 46