Sec 3.4
Zeros of Polynomial Functions

List the possible rational zeros- $\frac{\text{factors of the constant}}{\text{factors of the leading coefficient}}$

$f(x) = x^3 + 2x + 6$

poss: $\frac{\pm 6 \pm 3 \pm 2 \pm 1}{\pm 1}$

$\pm 6 \quad \pm 3 \quad \pm 2 \quad \pm 1$

6

$g(x) = -4x^3 - 3x + 10$

$\frac{\pm 10 \pm 5 \pm 2 \pm 1}{\pm 4 \pm 2 \pm 1}$

$\pm 5/2 \quad \pm 5 \quad \pm 10 \quad \pm 5/4$

$\pm 1/2 \quad \pm 1 \quad \pm 2 \quad \pm 1/4$

*this is called the rational zero theorem

Finding all zeros-

Find all zeros of $f(x) = x^3 + 2x^2 - 5x - 6$ $= (x+1)($

poss : $\pm 6 \pm 3 \pm 2 \pm 1$

$(x+1)(x^2+x-6)=0$

$x=-1$ $(x+3)(x-2)=0$

$x=-3, 2$

$x=\{-3,-1,2\}$

Find all zeros of $f(x) = x^3 + 7x^2 + 11x - 3$

poss: $\pm 3, 1$

$$\begin{array}{r|rrr} -3 & 1 & 7 & 11 & -3 \\ & & -3 & -12 & 3 \\ \hline & 1 & 4 & -1 & 0 \end{array}$$

$(x+3)(x^2+4x-1)=0$

$$x = \frac{-4 \pm \sqrt{16+4}}{2}$$

$$= \frac{-4 \pm \sqrt{20}}{2}$$

$$= \frac{-4 \pm 2\sqrt{5}}{2}$$

$$= -2 \pm \sqrt{5}$$

$\{-3, -2+\sqrt{5}, -2-\sqrt{5}\}$

Find all zeros of $f(x) = x^3 - 4x^2 + 8x - 5$

Suggested Practice

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9. a. $\pm 1, \pm 2, \pm 4$

b. $-2, -1, 2$

c. $-2, -1$ & 2

11.

a. $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{2}, \pm \frac{3}{2}$

b. $-2, \frac{1}{2}, 3$

c. same

13. a. $\pm 1, \pm 2, \pm 3, \pm 6$

b. -1

c. also $\frac{-3 \pm \sqrt{33}}{2}$

15. a. $\pm 1, \pm \frac{1}{2}, \pm 2$

b. -2

c. and... $\frac{-1 \pm i}{2}$