

2x) Find the zeros of $x^4 + 2x^3 - 7x^2 - 8x + 12$ $x = \pm 2, -3, 1$

① 1 → works!

② Synthetic → 1 polynomial long div $(x-1)$

$$\begin{array}{r|rrrrr} 1 & 1 & 2 & -7 & -8 & 12 \\ & & 1 & 3 & -4 & -12 \\ \hline & 1 & 3 & -4 & -12 & 0 \end{array}$$

$$x^3 + 3x^2 - 4x - 12$$

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

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

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

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

$$x = 2$$

$$x = -2$$

$$x = -3$$

Finding the Domain

Domain of Radical Expressions

The domain of $f(x) = \sqrt[n]{x}$ is $\begin{cases} \text{if } n \text{ is even} \rightarrow \text{Set what's in the radical } \geq \text{ to } 0 \text{ and solve} \\ \text{if } n \text{ is odd} \rightarrow \text{domain is ALWAYS } (-\infty, \infty) \end{cases}$

✓ Ex) Find the domain.

✓ a) $\sqrt{4-x}$

$$4-x \geq 0$$

$$4 \geq x$$

$$(-\infty, 4]$$

✓ b) $\sqrt[3]{x-6}$

$$(-\infty, \infty)$$

✓ c) $\sqrt[3]{3+x}$

$$3+x \geq 0$$

$$x \geq -3$$

$$[-3, \infty)$$

Domain of Rational Expressions

Set the denominator equal to zero and solve for x . These are the values *not* included in the domain.

Ex) Find the domain.

✓ a) $\frac{x+2}{x^2+2x-15}$

$$x^2 + 2x - 15 = 0$$

$$(x+5)(x-3) = 0$$

$$x = -5 \quad x = 3$$

$$(-\infty, -5) \cup (-5, 3) \cup (3, \infty)$$

✓ b) $\frac{2x}{x^2-5x-6}$

$$x^2 - 5x - 6 = 0$$

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

$$x = 6 \quad x = -1$$

$$(-\infty, -1) \cup (-1, 6) \cup (6, \infty)$$