

Warm Up

① Fix the error.

$$\begin{array}{r|rrrr} -6 & 1 & 6 & 25 & 150 \\ & \downarrow & -6 & 0 & -150 \\ \hline & 1 & 0 & 25 & 0 \end{array}$$

$$\sqrt{x^2 + 25} = 0$$

$$x = 5$$

$$\sqrt{x^2} = \pm \sqrt{25}$$

$$x = \pm 5i$$

② Solve.

$$x^2 + 36 = 0$$

$$\sqrt{x^2} = \pm \sqrt{-36}$$

$$x = \pm 6i$$

EXAMPLE 1:

Write the polynomial function given its roots are 3, -5, and $\frac{3}{4}$.

$$x = 3$$
$$x - 3 = 0$$

$$x = -5$$
$$x + 5 = 0$$

$$x = \frac{3}{4}$$
$$4x = 3$$
$$4x - 3 = 0$$

$$(x-3)(x+5)(4x-3)$$
$$= (x^2 + 5x - 3x - 15)(4x-3)$$

$$= (x^2 + 2x - 15)(4x-3)$$

$$= 4x^3 - 3x^2 + 8x^2 - 6x - 60x + 45$$

$$= 4x^3 + 5x^2 - 66x + 45$$

EXAMPLE 2:

Find a polynomial function of least degree with roots 4 and $\pm 5i$.

$$x = 4$$
$$x - 4 = 0$$

$$x = \pm 5i$$
$$x = \pm \sqrt{-25}$$
$$x^2 = -25$$
$$x^2 + 25 = 0$$

$$(x - 4)(x^2 + 25)$$

$$= x^3 + 25x - 4x^2 - 100$$

$$= x^3 - 4x^2 + 25x - 100$$

EXAMPLE 3: Find a polynomial function of least degree with roots of -6 and $\sqrt{15}$

$$x = -6 \quad (x = (\pm\sqrt{15}))^2$$

$$x^2 = 15$$

$$(x+6)(x^2-15)$$

$$x^3 - 15x + 6x^2 - 90$$

$$x^3 + 6x^2 - 15x - 90$$



Select a range:

low 2

high 32

15

Choose Random Number

Example 4: Find a polynomial function with zeros at 3 with a multiplicity of 2, 0, and $\pm\sqrt{7}$

$$x=3 \\ x-3=0$$

$$x=3 \\ x-3=0$$

$$x=0$$

$$x = \pm\sqrt{7}$$

$$x^2 = 7$$

$$x^2 - 7 = 0$$

$$(x-3)(x-3)(x)(x^2-7)$$

$$x^2 - 3x - 3x + 9$$

$$(x^2 - 6x + 9)(x^3 - 7x)$$

$$x^5 - 7x^3 - 6x^4 + 42x^2 + 9x^3 - 63x$$

$$= x^5 - 6x^4 + 2x^3 + 42x^2 - 63x$$