

Name **Homework Guide**

Date: \_\_\_\_\_

Find all of the zeros of the functions:

$$1. f(x) = x^3 + x^2 - 3x - 3 \quad -1 \mid 1 \mid +1 \mid -3 \mid -3$$

$$\quad \quad \quad \downarrow -1 \mid \emptyset \mid +3$$

$$\quad \quad \quad \hline \quad \quad \quad 1 \mid \emptyset \mid -3 \mid \emptyset$$

$$x^2 - 3 = 0$$

$$x^2 = 3$$

$$x = \pm \sqrt{3}$$

**Zeros**

1. -1 (calculator)

2.  $+\sqrt{3}$  (irrational)3.  $-\sqrt{3}$  (by factoring)

$$2. f(x) = 4x^3 - 8x^2 - 15x + 9$$

**Zeros**

1. +3 (calculator)

2.  $-3/2$  (rational by3.  $+1/2$  (factoring or synth div))

$$3. f(x) = x^3 + 2x^2 - 34x + 7 \quad -7 \mid 1 \mid +2 \mid -34 \mid +7$$

$$\quad \quad \quad \downarrow -7 \mid +35 \mid -7$$

$$\quad \quad \quad \hline \quad \quad \quad 1 \mid -5 \mid +1 \mid \emptyset$$

$$\quad \quad \quad x^2 - 5x + 1 = 0$$

$$\frac{5 \pm \sqrt{(-5)^2 - 4(1)(1)}}{2(1)}$$

$$\frac{5 \pm \sqrt{21}}{2}$$

There are not  
2 numbers that  
multiply to equal  
+1 and add to be -5.

So use Quadratic Formula

**Zeros**

1. -7 (calculator)

2.  $\frac{5 - \sqrt{21}}{2}$  (irrational3.  $\frac{5 + \sqrt{21}}{2}$  (by Quadratic Formula))

4.  $f(x) = x^4 + 4x^3 - 14x^2 - 20x - 3$

$$\begin{array}{r} -1 \mid 1 \ 4 \ -14 \ -20 \ -3 \\ \quad \downarrow -1 \ -3 \ +17 \ +3 \\ 3 \mid 1 \ +3 \ -17 \ -3 \ \neq \emptyset \\ \quad \downarrow +3 \ +18 \ +3 \\ \quad 1 \ +6 \ +1 \ \neq \emptyset \end{array}$$

$x^2 + 6x + 1 = 0$

- does not factor
- Can use Quadratic Formula or Complete the Square

Quadratic Formula

$$\frac{-6 \pm \sqrt{(6)^2 - 4(1)(1)}}{2(1)}$$

$$\frac{-6 \pm \sqrt{32}}{2}$$

$$\frac{-6 \pm 4\sqrt{2}}{2}$$

$$\frac{-6}{2} \pm \frac{4\sqrt{2}}{2}$$

$$-3 \pm 2\sqrt{2}$$

Complete the square

$$x^2 + 6x + \underline{\quad} = -1 + \underline{\quad}$$

$$x^2 + 6x + 9 = -1 + 9$$

$$\sqrt{(x+3)^2} = \sqrt{8}$$

$$x+3 = \pm 2\sqrt{2}$$

$$x = -3 \pm 2\sqrt{2}$$

ZEROS

1. -1 (calculator)
2. 3 (calculator)
3.  $-3 + 2\sqrt{2}$  (Irrational)
4.  $-3 - 2\sqrt{2}$  (By Q.F)

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

ZEROS

1. -1 (calculator)
2.  $\sqrt{2}$  (Irrational)
3.  $-\sqrt{2}$  (By Factoring)

6.  $f(x) = x^4 + 2x^3 - 17x^2 - 30x + 8$

ZEROS

1. -2 (calculator)
2. 4 (calculator)
3.  $2 + \sqrt{5}$  (Irrational)
4.  $2 - \sqrt{5}$  (by Quadratic Formula)