

Name \_\_\_\_\_

# Homework Guide

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

## Rational, Irrational and Imaginary Zeros.

Find all Zeros, Roots, or Factors:

1.  $f(x) = x^3 - x^2 + 9x - 9$

$$x^2(x-1) + 9(x-1) = 0$$

$$(x^2 + 9)(x-1) = 0$$

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

SOTS

2.  $f(x) = 4x^3 - 16x^2 + 9x + 9$

Zeros:

1.  $x=1$
2.  $x=3i$
3.  $x=-3i$

Roots:

1.  $x=3$
2.  $x=3/2$
3.  $x=-1/2$

3.  $g(x) = x^4 - 5x^2 - 36$

$$(x^2 + 4)(x^2 - 9) = 0$$

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

SOTS

DOTS

4.  $f(x) = x^4 - x^3 - 6x^2 - 50x - 100$

Factors:

1.  $(x-3)$
2.  $(x+3)$
3.  $(x-2i)$
4.  $(x+2i)$

Zeros:

1.  $x=-2$
2.  $x=5$
3.  $x=-1+3i$
4.  $x=-1-3i$

5.  $f(x) = 2x^3 + x^2 - 16x - 15$

$$\begin{array}{r|rrrr} -1 & 2 & 1 & -16 & -15 \\ & \downarrow & -2 & +1 & +15 \\ \hline & 2 & -1 & -15 & 0 \end{array}$$

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

$$(2x + 5)(x - 3) = 0$$

$$x = -\frac{5}{2} \quad x = 3$$

Roots:

1.  $x = -1$
2.  $x = 3$
3.  $x = -5/2$

6.  $h(x) = x^4 - 8x^2 - 9$

Zeros:

1.  $x = 3$
2.  $x = -3$
3.  $x = i$
4.  $x = -i$

Given the following sets of roots, find the polynomial:

7) 4, 3, -2, 1

$$f(x) = x^4 - 6x^3 + 3x^2 + 26x - 24$$

8) -3,  $\pm 2i$

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

9) 5, -2,  $3i$

$$\begin{aligned} & (x-5)(x+2)(x-3i)(x+3i) \\ & (x^2+2x-5x-10)(x^2+3xi-3xi-9i^2) \\ & (x^2-3x-10)(x^2+9) \\ & x^4+9x^2-3x^3-27x-10x^2-90 \end{aligned}$$

$$f(x) = x^4 - 3x^3 - x^2 - 27x - 90$$

10) -2,  $-3\sqrt{5}$

$$\begin{aligned} & (x+2)(x-3\sqrt{5})(x+3\sqrt{5}) \\ & (x+2)(x^2+3x\sqrt{5}-3x\sqrt{5}-9\cdot 5) \\ & (x+2)(x^2-45) \\ & x^3-45x+2x^2-90 \end{aligned}$$

$$f(x) = x^3 + 2x^2 - 45x - 90$$