

Math Sheet

Name _____ Score _____ / 12 Teacher _____ Date _____

Irrational and Imaginary Root Theorems

For root counts, use degree and conjugate pairing only; do not solve. Count multiplicity; complex roots include real roots. Then complete root lists and construct monic integer polynomials.

A. Count possible real and nonreal complex roots

1. $x^2 + 4x - 8$

Total complex roots: _____

Possible real/nonreal pairs: _____

2. $x^6 + 2x^5 + 9x^2 + 3x + 8$

Total complex roots: _____

Possible real/nonreal pairs: _____

3. $x^4 - 6x^3 + 7x^2 - 3x - 1$

Total complex roots: _____

Possible real/nonreal pairs: _____

4. $x^3 + 8x^2 + 4x - 1$

Total complex roots: _____

Possible real/nonreal pairs: _____

B. Complete each rational-coefficient root list

5. Given roots: $-1 - \sqrt{3}i$, $1 - \sqrt{3}i$, 4

Missing roots: _____

6. Given roots: $3 - \sqrt{5}i$, $3 + \sqrt{5}i$, $-3 + \sqrt{3}$, $-2 + i$

Missing roots: _____

7. Given roots: $-3 + 2i$, 4 (multiplicity 2), -4

Missing roots: _____

8. Given roots: $-4 + \sqrt{5}$, -4

Missing roots: _____

C. Construct the least-degree monic integer polynomial

9. Given roots: $-3 + \sqrt{3}$

Least-degree monic polynomial: _____

10. Given roots: $2 + 2i$, $2 + \sqrt{2}$

Least-degree monic polynomial: _____

11. Given roots: $3 - 4i$, -4 (multiplicity 2), -2

Least-degree monic polynomial: _____

12. Given roots: $4 - \sqrt{2}i$, -4

Least-degree monic polynomial: _____
