Name_____

Sec. 2.6 – Factoring Polynomials with All Methods

Factor each polynomial by using one of the following methods: quadratic form, grouping, or the rational root theorem. Label which method you use. Then solve for all real and imaginary roots by hand. No graphing calculators!

1. $x^3 - 5x^2 - x + 5 = 0$

$x = 5, 1, -1$

2. $x^4 - 2x^2 - 15 = 0$

$\pm\sqrt{5} \quad \pm i\sqrt{3}$

3. $x^6 + 2x^4 - 16x^2 - 32 = 0$

$(x^4 - 16)(x^2 + 2)$

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

$\pm 2 \pm 2i \quad \pm i\sqrt{2}$

4. $x^3 + 4x^2 + 5x + 2 = 0$

$x = -1, -2$

DR

5. $x^4 - 13x^2 + 40 = 0$

$\pm\sqrt{5} \quad \pm 2\sqrt{2}$

6. $x^4 + 14x^2 + 45 = 0$

$\pm i\sqrt{5} \quad \pm 3i$

7. $3x^3 + 11x^2 + 5x - 3 = 0$

$\frac{1}{3}, -3, -1$

8. $2x^4 + x^2 - 6 = 0$

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

$\pm\frac{\sqrt{6}}{2} \quad \pm i\sqrt{2}$

9. $4x^3 - x^2 - 4x + 1 = 0$

$(4x-1)(x^2-1)$

$x = \frac{1}{4}, -1, 1$

10. $5x^4 - 46x^3 + 84x^2 - 50x + 7 = 0$

DR

$x = \frac{1}{5}, 1, 7$

11. $4x^8 - 61x^4 + 225 = 0$

$(4x^4-25)(x^4-9)$

$(2x^2+5)(2x^2-5)(x^2+3)(x^2-3)$

$x^2 = -3$

$2x^2 = -\frac{5}{2}$

$x = \pm i\sqrt{\frac{5}{2}}, \pm\sqrt{\frac{5}{2}}, \pm i\sqrt{3} \quad \pm\sqrt{3}$

12. $10x^3 - 8x^2 + 25x - 20 = 0$

$\frac{4}{5}, \frac{\pm i\sqrt{10}}{2}$

13. $8x^4 + 10x^2 - 3 = 0$

$(2x^2+3)(4x^2-1)$

$x = \frac{\pm i\sqrt{6}}{2} \quad \pm\frac{1}{2}$

14. $x^4 - 26x^2 - 27 = 0$

$\pm 3\sqrt{3}, \pm i$

15. $5x^3 - 10x^2 + 3x - 6 = 0$

$(5x^2+3)(x-2)$

$x = \frac{\pm i\sqrt{15}}{5}, 2$

16. $4x^3 - 9x^2 + 6x - 1 = 0$

$1, \frac{1}{4}$

DR