HN Math III: Unit 3 – Day 5 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**SOLVING CUBICS**

1. **Solve the following polynomials by factoring:**
	1. $x^{4}+5x^{2}+4=0$ b. $x^{3}+2x^{2}-7x-14=0$
2. **Solve by graphing:**

**Ex 1:** $x^{3}+3x^{2}=x+3$ **Ex 2:** $x^{3}-4x^{2}-x=57$

How many solutions *should* we get? \_\_\_\_\_\_ How many solutions *should* we get? \_\_\_\_\_\_

How many are real? \_\_\_\_\_ How many are real? \_\_\_\_\_

What are the real solutions? \_\_\_\_\_ What are the real solutions? \_\_\_\_\_

If solutions are missing, they are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. **Find ALL zeros of the following polynomials.**

**Ex 3:** $3x^{3}+x^{2}-x+1=0$

a) How many total roots are there? \_\_\_\_\_\_\_

b) Find the roots in the calculator. How many do you see? \_\_\_\_\_ Root: \_\_\_\_\_\_

c) Use this root as the divisor in a synthetic division problem:

d) So the factors are: (x )( ). We know that x = \_\_\_\_, so how do we find the other 2?

e) Find the other solutions:

 Final Solutions:

**Ex 4**: $y=2x^{3}+x^{2}+1$

1. How many total zeros are there? \_\_\_\_\_\_\_
2. How many are real? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. So, there must be \_\_\_\_\_ imaginary solutions. Use the real zero to divide:
4. Use the quadratic formula/completing the square to find the other zeros.

Final Solutions:

**Ex 5**: $x^{3}-3x^{2}+9x+13=0$ **Ex 6:** $f\left(x\right)=x^{3}+2x^{2}-5x-10$

**Practice:**

Find all the roots of the following polynomials.

1. $x^{3}+14x^{2}+13x+6=0$ 2. $x^{3}-\frac{1}{2}x^{2}+20x-10=0$
2. $x^{3}-4x^{2}+9x-36=0$ 4. $x^{3}+2x^{2}+5x+10=0$