Algebra 2, Period 2 – Dr Sargent – Work for April 13-24

April 13-17 – Solving Polynomials by Factoring

In the last packet of work, we worked on factoring polynomials. If you do not remember, please go back and review the material in Packet 1. Now we are ready to begin with using factoring to solve polynomials, just as we previously used factoring to solve quadratic equations. You will see on the attached worksheet the steps involved in doing this:

1. Move all terms to one side and set the equation equal to 0
2. Factor the polynomial completely!
3. Set each factor equal to zero and solve for each x-value.

For a quadratic equation, solve by square roots, completing the square, or the quadratic formula

And don't forget to simplify all irrational and complex solutions!

So let's try a couple of the problems to get the idea:

Problem 1: $x^3 + x = 0;\ x(x^2 + 1) = 1; x = 0\ and\ x^2 + 1 = 0; x^2 = -1; x = \pm\sqrt{-1} = \pm i\sqrt{1} = \pm i$. Thus, the answer is $x = \{0, \pm i\}$

Now see if you can do the rest of the problems. Once again, refer back to the previous packet for helps. I have included answers to selected problems at the end of these instructions so you can check your work, but I urge you to please try and solve the problems yourself before checking the answers. You do NOT need to turn this in or return this to me, but if you have questions about it, feel free to contact me.

Once you have a good grasp of the worksheet, try your hand at doing Homework 5, which is also attached. When you have completed this, please return a copy to me. You can do this by taking a picture of it and attaching the picture to a message; by scanning it and returning the scan; or by bringing a written copy to the school and placing it in the box at the school entrance between 9-11 am any school day. If you return a written copy, please make sure both my name and yours is on the paper. Please remember to show your work.

April 20-24 – Quiz 5-1

Please complete Quiz 5-2 and return this to me, using any of the methods listed above.

Continuing ALEKS assignment Please remember that your regular weekly assignment of 12 topics on ALEKS continues.

Answers to Selected Questions

Solving Polynomial Equations by Factoring (I have shown how to do each selected problem)

Problem 3: $x^4 - 64 = 0; Factors\ as\ (x^2 + 8)(x^2 - 8) = 0; Setting\ each\ factor\ equal\ to\ 0$:

$$x^2 + 8 = 0;\ x^2 = -8; x = \pm\sqrt{-8} = \pm\sqrt{-1 * 4 * 2} = \pm 2i\sqrt{2}$$

$$x^2 - 8 = 0;\ x^2 = 8; x = \pm\sqrt{8} = \pm 2\sqrt{2}$$

Thus, the answer is: $x = \pm 2\sqrt{2}, \pm 2i\sqrt{2}$

Problem 5: $x^3 + 125 = 0$. This problem is the sum of cubes, which factors as: $(x + 5)(x^2 - 5x + 25) = 0$. Setting each factor = to 0 gives us the following: $x + 5 = 0; x = -5$

$$x^2 - 5x + 25 = 0; Using\ the\ quadratic\ formula\ gives\ us: \frac{5 \pm \sqrt{(-5)^2 - (4)(1)(25)}}{2(1)}$$

$$= \frac{5 \pm \sqrt{25 - 100}}{2} = \frac{5 \pm \sqrt{-75}}{2} = \frac{5 \pm 5i\sqrt{3}}{2}$$

Thus, the answers are: $x = \{-5, \frac{5 \pm 5i\sqrt{3}}{2}\}$

Problem 8: $16x^3 = 54; 16x^3 - 54 = 0; 2(8x^3 - 27) = 0; 2(2x - 3)(4x^2 + 6x + 9) = 0$ (This was a different of cubes). Now we set each x-factor equal to 0:

$$2x - 3 = 0; 2x = 3; x = \frac{3}{2}$$

$$4x^2 + 6x + 9 = 0; x = \frac{-6 \pm \sqrt{6^2 - 4(4)(9)}}{2(4)} = \frac{-6 \pm \sqrt{36 - 144}}{8} = \frac{-6 \pm \sqrt{-108}}{8}$$

$$= \frac{-6 \pm 6i\sqrt{3}}{8} = \frac{-3 \pm 3i\sqrt{3}}{4}$$

Thus our answers are $x = \{\frac{3}{2}, \frac{-3 \pm 3i\sqrt{3}}{4}\}$

Problem 12: $2x^6 - 10x^4 - 48x^2 = 0; 2x^2(x^4 - 5x^2 - 24) = 0; 2x^2(x^2 - 8)(x^2 + 3) = 0$

We now set each x-factor equal to zero and have 3 separate equations to solve:

$$2x^2 = 0; x = 0$$

$$x^2 - 8 = 0; x^2 = 8; x = \pm\sqrt{8} = \pm 2\sqrt{2}$$

$$x^2 + 3 = 0;\ x^2 = -3; x = \pm\sqrt{-3} = \pm i\sqrt{3}$$

Thus, our answers are: $x = 0, \pm 2\sqrt{2}, \pm i\sqrt{3}\}$

Problem 15: $x^3 + 2x^2 + 5x + 10 = 0$ We must factor this one by grouping, so let's factor the first two terms and then the next two terms, and we get this: $x^2(x + 2) + 5(x + 2) = 0;\ (x^2 + 5)(x + 2) = 0$. Now we set each x-factor equal to zero and get these equations:

$$x^2 + 5 = 0;\ x^2 = -5; x = \pm\sqrt{-5} = \pm i\sqrt{5}$$

$$x + 2 = 0; x = -2$$

Our answers are: $x = \{-2, \pm i\sqrt{5}\}$

Unit 5 Homework 5 – (Answers only – show your work)

Problem 1: $x = \{0, \frac{1}{4}\}$

Problem 4: $x = \{-8, 4 \pm 4i\sqrt{3}\}$

Problem 7: $x = \{-2,0,10\}$

Problem 10: $x = \{-3, \pm 2\sqrt{6}\}$

Problem 12: 8.66 years

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples
SOLVING POLYNOMIAL EQUATIONS *By Factoring*	① **MOVE ALL TERMS** to one side and set the equation **EQUAL TO 0.** ② **FACTOR** the polynomial **completely!** ③ **SET EACH FACTOR EQUAL TO 0** and **SOLVE** for each x-value. ➢ For quadratic equations, solve by **square roots, completing the square,** or the **quadratic formula.** ➢ **SIMPLY** all **irrational** and **complex** solutions!

Directions: Solve each equation by factoring.

1. $x^3 + x = 0$

2. $4x^3 - 7x^2 = 3x^2$

3. $x^4 - 64 = 0$

4. $5x^5 - 80x = 0$

5. $x^3 + 125 = 0$

6. $8x^5 + 5x^2 = 4x^2$

7. $x^3 - 216 = 0$

8. $16x^3 = 54$

9. $x^4 + x^2 - 42 = 0$

10. $x^4 + 3 = 13 - 9x^4$

11. $x^3 - 8x^2 + 16x = 0$

12. $2x^6 - 10x^4 - 48x^2 = 0$

13. $3x^4 - 2x^2 = 16$

14. $5x^4 + 13x^2 - 8 = x^2 + 1$

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

16. $2x^3 - 3x^2 - 32x + 48 = 0$

Name: _____ **Unit 5:** Polynomial Functions

Date: _____ **Bell:** _____ **Homework 5:** Solving Polynomial Equations

Directions: Solve each equation by **factoring.** Simply all irrational and complex solutions.

1. $12x^3 - 3x^2 = 0$

2. $9x^4 - 16 = 0$

3. $2x^4 = 9x^2$

4. $x^3 + 512 = 0$

5. $8x^3 - 125 = 0$

6. $81x^4 = 3x$

7. $2x^3 - 16x^2 - 40x = 0$

8. $x^4 - 16x^2 = x^2 + 18$

9. $4x^4 + 35x^2 - 9 = 0$

10. $x^3 + 3x^2 = 24x + 72$

11. $2x^3 - 5x^2 + 40x - 100 = 0$

12. The population of a species is modeled by the equation $\boldsymbol{p(t) = -t^4 + 72t^2 + 225}$, where t is the number of years. Find the approximate number of years until the species is extinct.

Name: _____ **Algebra 2**

Date: _____ **Per:** _____ **Unit 5:** Polynomial Functions

Quiz 5-2: Factoring & Solving Polynomial Equations

Factor each polynomial completely.

1. $10x^5y - 40xy^3$

2. $a^5b - 64ab$

3. $250m^3 + 54$

4. $k^4 - 10k^2 - 39$

5. $4w^4 + 16w^2 + 15$

6. $2n^3 + 7n^2 - 2n - 7$

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

Solve each equation by factoring. Simplify all irrational and complex solutions.

7. $x^3 + 18x = 0$

8. $2x^4 = 50$

7. _____

8. _____

9. $x^3 + 216 = 0$

10. $24x^3 - 81 = 0$

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

11. $x^3 = x^2 + 20x$

12. $x^4 + 13x^2 + 40 = 0$

13. $x^4 - x^2 = x^2 + 8$

14. $3x^4 - 8x^2 + 5 = 0$

15. $4x^3 + 5x^2 - 16x - 20 = 0$