

Math 127: Review for Test 2

Review Problems: Chapter 5 Test, pg 398: 15, 18, 19, 20 – 27 ALL, 32
Chapter 6 Test, pg 458: 1, 3, 4, 5, 7, 8, 11, 12, 13, 17, 18, 19, 21, 23, 24, 25, 27, 28, 29, 30
Chapter 10 Test, pg 733: 2, 3, 4, 5, 26, 27, 28, 29
Chapter 11 Test, pg 814: 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 17, 23, 27, 25

1. Long Division and Synthetic Division:

Be able to divide one polynomial by another using either technique.
Be sure to fill in missing terms!
Know what type of division problems can be done using synthetic division.

2. Exponents: Know and apply all of the rules of exponents. (Tip: Write out all the rules from memory!)

Guideline for simplifying:

- Remove parentheses by distributing exponents
- Reposition negative exponents (no negative exponents left in final answer)
- Combine across (add powers of common bases)
- Reduce (subtract powers of common bases)

3. Factoring: Guideline for factoring: Note: Factor completely...keep factoring the factors until they can't be factored anymore.

- Look for and factor out the GCF first
- Two terms: Look for the difference of two squares $a^2 - b^2 = (a - b)(a + b)$
Remember: SUM of square is NOT factorable: $a^2 + b^2$ doesn't factor!!!
- Three terms: Trinomial techniques, Split the Middle Term
- Four terms: grouping

4. Rational (fractional) Exponents

Rational exponents: **Roots** of trees grow **below**---the root is given by the denominator of the fractional power.

$$x^{\frac{\text{power}}{\text{root}}} = \left(\sqrt[\text{root}]{x}\right)^{\text{power}}$$

Remember that a negative power causes a "flip"! $x^{-1/2} = \frac{1}{x^{1/2}}$

5. Quadratic Equations, Complex Numbers

- Solve a quadratic equation by
 - factoring (set equation = 0 first, THEN factor)
 - taking square roots (remember to apply the Square Root Principle and take $\pm\sqrt{\quad}$ of the right side)
 - completing the square (don't forget to divide out by the coefficient of x^2 !)
 - quadratic formula (if $ax^2 + bx + c = 0$ then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$) MEMORIZE this formula!

B. Recognize equations that are quadratic in form (3 terms and leading power = 2. • middle power)

Solve this type of equation by substitution (set u = middle terms' base and power).

Make sure to finish solving for the original variable given in the problem!

C. Complex numbers: Know that $i = \sqrt{-1}$ and that complex numbers are of the form $a + bi$

- rewrite $\sqrt{-\text{number}}$ in terms of i e.g. $\sqrt{-4} = \sqrt{4(-1)} = \sqrt{4} \cdot \sqrt{-1} = 2i$
- Add, subtract, multiply complex numbers (treat i like x , but remember to replace i^2 with -1)
- Divide complex numbers by rationalizing the denominator (multiply by the conjugate)

D. Use the discriminant to determine what type of solution a quadratic equation will have:

- $b^2 - 4ac$ is
- positive and a perfect square \Rightarrow two real, rational solutions (original quadratic was factorable)
 - positive and not a perfect square \Rightarrow two real solutions involving radicals (irrational)
 - zero \Rightarrow one real, rational solution
 - negative \Rightarrow two complex conjugate solutions