Summer MA 15200 Lesson 13 Section 1.6, Section 1.7 (part 1)

I Solving Polynomial Equations

Linear equation and quadratic equations of 1 variable are specific types of polynomial equations. Some polynomial equations of a higher degree can be solved by factoring.

1. Always look for a GCF first.
2. Factor using a difference of squares, trinomial methods, or grouping.

Ex 1: $6y^4 - 12y^2 = y^3$

Ex 2: $4x^4 + 9 - 37x^2 = 0$

Ex 3: $x^3 + 3x^2 - 36x - 108 = 0$

II Solving radical equations

Just as both sides of an equation may have the same number added or be multiplied by the same number, both sides of an equation may be raised to the same power. However, we must be careful.

Power Property for equations: When both sides of an equation are raised to the same power, the solutions that result ***may be*** solutions of the original equation. For example:

$x = 2$ solution is 2

$x^2 = 4$ solutions are -2 and 2

Raising both sides to the same power may result in an equation not equivalent to the original equation (different solution sets). These 'extra' solution or solutions (such as the -2 solution for the second equation) is/are known as **extraneous solution(s)** (solutions that don not satisfy the original equation). Therefore, whenever the power property for equations is used, **all possible solutions must be checked in the original equation.**

Solving Radical Equations:

1. Isolate the radical expression on one side of the equation or put one radical on each side.
2. Raise both sides of the equation to a power equal to the index.
3. Solve the result.
4. Remember to check all possible solutions in the original equation, since the power property for equations was used.

Hint: If a binomial is on the side opposite the radical side, FOIL must be used when squaring.

Ex 4: $\sqrt{x-2}+1=3$

Ex 5: $\sqrt{x-16}=\frac{3}{5}\sqrt{x}$

Ex 6: $\sqrt{5-x}=x+1$

Ex 7: $x-8x^{\frac{1}{2}}+12=0$

III Solving Basic Equations with Rational exponents

$\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = x^1 = x$ This is the idea when solving with rational exponents. Raise both sides of the equation to the reciprocal power so that the variable expression is to the first power.

Solving equations of the form $x^{\frac{m}{n}} = k$

If m is even: $\left(x^{\frac{m}{n}}\right)^{\frac{n}{m}} = \pm x^{\frac{n}{m}}$

If m is odd: $\left(x^{\frac{m}{n}}\right)^{\frac{n}{m}} = x^{\frac{n}{m}}$

Ex 8: Solve each. Remember to check.

$a)$ $x^{\frac{2}{3}} = 16$

$b)$ $(x+1)^{\frac{3}{2}} = 27$

IV Solving Absolute Value Equations

If $|x| = 2$, what value(s) could x equal?

You should see there could be 2 values for x, -2 or 2. Most absolute value equations will have two solutions, such as this equation. This is because an absolute value of a negative value or positive value would both be positive. Remember, absolute value means distance from zero and distance is always positive.

Exceptions will be equations such as $|x| = 0$ or $|x| = -5$. If an absolute value equals zero, there is only one value of x that will give zero, since only the absolute value of 0 is 0. An equation of the form absolute value equal a negative will never be true. This type of equation will always be 'no solution', inconsistent.