7.6

Quadratic Equations

quadratic equations - a polynomial of degree 2.

ex $5x^2+4x-2=0$, $x^2-x+10=0$, etc.

quadratic form - $ax^2+bx+c=0$

Sometimes not written in quadratic form.

ex $3x^2+7x-4=2x-5$
$-2x \quad +5 \quad -2x \quad +5$
$3x^2+5x+1=0$

zero-factor property
If $ab=0$ then $a=0$ or $b=0$.

This says if two things multiplied together are zero then one if them is equal to zero.

ex $(x+2)(x-10)=0$
either $x+2=0$ or $x-10=0$
$x=-2$ or $x=10$

Solving Quadratic Equations by factoring

1. Write equation in ax^2+bx+c
2. Factor the left-hand side
3. Set each factor to zero
4. Solve each equation
5. Check solution(s) in original equation

ex) $x^2+5x+10=4$

1. $x^2+5x+6=0$
2. $(x+2)(x+3)=0$
3. $x+2=0$ or $x+3=0$
4. $x=-2$ or $x=-3$
5. $(-2)^2+5(-2)+10 \stackrel{?}{=} 4$
   $4-10+10 \stackrel{?}{=} 4$
   $4=4$ ✓

   $(-3)^2+5(-3)+10 \stackrel{?}{=} 4$
   $9-15+10 \stackrel{?}{=} 4$
   $4=4$ ✓

ex) $3x^3+6x^2=24x$

1. $3x^3+6x^2-24x=0$
2. $3x(x^2+2x-8)=0$
   $3x(x+4)(x-2)=0$
3. $3x=0$ or $x+4=0$ or $x-2=0$
4. $x=0$ or $x=-4$ or $x=2$
5. $3(0)^3+6(0)^2 \stackrel{?}{=} 24(0)$
   $0+0 \stackrel{?}{=} 0$
   $0=0$ ✓

   $3(-4)^3+6(-4)^2 \stackrel{?}{=} 24(-4)$
   $-192+96 \stackrel{?}{=} -96$
   $-96=-96$ ✓

   $3(2)^3+6(2)^2 \stackrel{?}{=} 24(2)$
   $24+24 \stackrel{?}{=} 48$
   $48=48$ ✓