BE-1B MONDAY 2-12-07

SOLVE EACH QUADRATIC EQUATION by FACTORING (i.e., USE THE "MAGIC NUMBER" METHOD) $\Rightarrow$ for $ax^2+bx+c=0$

sum $\Rightarrow b$

prod $\Rightarrow ac$

? ?

- THEN "SPLIT" THE bx term AND FBG
- FINALLY, USE ZPP to find both x's!

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1. $x^2-9x+14=0$

2. $3x^2-7x-6=0$

To use the "magic number" method the quadratic must have factors. If the quadratic is prime, it has no factors and there are no "magic numbers" that work.

Ex) $3x^2+2x-6=0$

Is there any way to tell if the quadradic can be factored?

Yes: put it in $ax^2+bx+c=0$ form

Find b^2-4ac

If b^2-4ac is a positive perfect square, the quadratic can be factored.

Lets look at the first BE problem

$$x^2 - 9x + 14 = 0$$

$a = 1$
$b = -9$
$c = 14$

$b^2 - 4ac$

$(-9)^2 - 4(1)(14)$

$81 - 56$

$\boxed{25}$

Yes, positive perfect square, it can be factored

$b^2 - 4ac$ is called the discriminant of the quadratic because it tells you things about the solution to the equation.

WHAT ELSE DOES IT TELL YOU?

If b^2-4ac is positive AND NOT a perfect square, the two solutions are irrational and you need to use the QF to find them.

If b^2-4ac is NEGATIVE, there are NO real number solutions.

Ex) Look at the 2nd BE problem, find the value of the discriminant

$$3x^2-7x-6=0$$

$a=3$
$b=-7$
$c=-6$

b^2-4ac

$(-7)^2-4(3)(-6)$

$49+72$

$\boxed{121}$

CAN be factored, 121 is a PS.

LETS LOOK AT THE DISCRIMINANT

for $3x^2 + 2x - 6 = 0$

$a = 3$

$b = 2$

$c = -6$

$b^2 - 4ac$

$(2)^2 - 4(3)(-6)$

$4 + 72$

$\boxed{76}$ POSITIVE, but NOT A P.S. need THE QF.

QF $\Rightarrow$ $x = \dfrac{-b \pm \sqrt{d}}{2a}$

$$\boxed{x = \frac{-2 \pm \sqrt{76}}{6}}$$ EXACT

CALCULATOR

$x = \dfrac{-2 + \sqrt{76}}{6}$

$x \approx \boxed{1.12}$

$x = \dfrac{-2 - \sqrt{76}}{6}$

$x \approx \boxed{-1.79}$

As long as the discriminant is positive, you can always use the QF. Ex) BE #1

$$x^2 - 9x + 14 = 0$$

$a = 1$ $\quad b^2 - 4ac$

$b = -9$ $\quad (-9)^2 - 4(1)(14)$

$c = 14$ $\quad 81 - 56$

$25 = d$

$$x = \frac{-b \pm \sqrt{d}}{2a}$$

$$x = \frac{-(-9) \pm \sqrt{25}}{2}$$

$$x = \frac{9 \pm 5}{2}$$

$x = \frac{14}{2} = 7$ $\qquad$ $x = \frac{4}{2} = 2$

Pg. 550 # 10, 11, 12

Find d = discriminant

For # 10, solve using the QF $\Rightarrow$ $x = \dfrac{-b \pm \sqrt{d}}{2a}$

or $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Homework: Pg 550

14 to 17
