

BE-Alg. 2 | MONDAY 11-14-11

ACT
Barron's

① $2i^4 - i^6 = ?$

② If $p + 2\sqrt{x-1} = 8$ and $8 > p$, what is $x-1$ in terms of p and 8 ?

(A) $\frac{\sqrt{8-p}}{2}$

(B) $\sqrt{\frac{8-p}{2}}$

(C) $\frac{8-p}{2}$

(D) $\frac{(8-p)^2}{2}$

(E) $\frac{(8-p)^2}{4}$

ANS

① $2i^4 - i^6$

$2(1) - (i^4)(i^2)$

$2 - (1)(-1) = 2 + 1 = \boxed{3}$

② $p + 2\sqrt{x-1} = 8$
 $-p \qquad -p$

$\frac{2\sqrt{x-1}}{2} = \frac{8-p}{2}$

$\sqrt{x-1} = \frac{8-p}{2} \therefore x-1 = \left(\frac{8-p}{2}\right)^2$

$x-1 = \frac{(8-p)^2}{4}$ ANS
(E)

(Zero Product Property)

It is EASY to use the ZPP to solve
A quadratic equation THAT can be
factored. It requires you to put
(quadratic equation)
the QE in STANDARD form $\Rightarrow ax^2 + bx + c = 0$

(PST)

Perfect Square Trinomials are particularly
EASY to factor and solve:

"FLORIDA"

Since
 $(a+b)(a+b)$
 $= a^2 + 2ab + b^2$

$$x^2 + 10x + 25 = 0$$

② $\swarrow$ $\searrow$
 $(x+5)^2 = 0$

$x = \{5\}$

What if you had a PST but the
right side was NOT zero?

EX1
Pg 306

$$x^2 + 10x + 25 = 49$$

$$(x+5)^2 = 49$$

Solve by using
square roots

$$\sqrt{(x+5)^2} = \pm \sqrt{49}$$

Don't forget
⊕

$$x+5 = \pm 7$$

$x = -5 \pm 7$ or $x = \{2, -12\}$

THE ability to take the square root to solve Perfect Square Trinomials leads to the most powerful method of solving Quadratic Equations. A method that can solve ANY quadratic equation, whether it can be factored or not!

The idea is to use Algebra to force any quadratic to be A Perfect Square Trinomial. It is called "Completing The Square"

The leading coefficient must be ONE!
If not, divide everything by a to make it ONE!!

EX
CTS

$$x^2 + 8x - 20 = 0$$

Not A PST, CTS.

$$x^2 + 8x + 16 = 20 + 16$$

$a=1$ ✓ MAKE A HOLE
Take $\frac{1}{2}$ of b and square it, add to both sides

$$(x+4)^2 = 36$$

$$\left(\frac{1}{2} \cdot 8\right)^2 = 4^2 = 16$$

$$x+4 = \pm\sqrt{36}$$

$$x = -4 \pm 6$$

$$x = \{2, -10\}$$

Checks?

✓

$$\textcircled{\text{Ex}} \quad x^2 + 3x - 18 = 0$$

$$x^2 + 3x + \frac{9}{4} = 18 + \frac{9}{4}$$

$$\left(\frac{3}{2}\right)^2 = \frac{9}{4}$$

$$\left(\frac{1}{2}b\right)^2$$

$$\left(x + \frac{3}{2}\right)^2 = \frac{72}{4} + \frac{9}{4}$$

$$x + \frac{3}{2} = \pm \sqrt{\frac{81}{4}} = \pm \frac{9}{2}$$

$$x = -\frac{3}{2} \pm \frac{9}{2}$$

$$x = \{3, -6\}$$

Checks? /

$$\textcircled{\text{Ex}} \quad x^2 - 8x + 11 = 0$$

$$x^2 - 8x + 16 = -11 + 16$$

$$(x-4)^2 = 5$$

$$x-4 = \pm\sqrt{5}$$

$$x = 4 \pm \sqrt{5} \text{ or } x = \{4 + \sqrt{5}, 4 - \sqrt{5}\}$$

$\textcircled{\text{CK}} \quad (4 + \sqrt{5})^2 - 8(4 + \sqrt{5}) + 11 \stackrel{?}{=} 0$ } Check
 $\textcircled{4 + \sqrt{5}} \quad 16 + 8\sqrt{5} + 5 - 32 - 8\sqrt{5} + 11 \stackrel{?}{=} 0$ } $4 - \sqrt{5}$ too!
 $21 - 32 + 11 \stackrel{?}{=} 0 \checkmark$

What if leading coefficient is not 1?

EX 5
pg 309

Ch. 6-4 "Completing The Square"

$$\frac{2x^2}{2} - \frac{5x}{2} + \frac{3}{2} = 0 \quad \div \text{ by } a$$

$$x^2 - \frac{5}{2}x + \frac{3}{2} = 0$$

$$x^2 - \frac{5}{2}x + \frac{25}{16} = -\frac{3}{2} + \frac{25}{16}$$

$\left(\frac{1}{2} \cdot \frac{5}{2}\right)^2 = \frac{25}{16}$
 $\left(\frac{1}{2}b\right)^2$

$$\left(x - \frac{5}{4}\right)^2 = \frac{-24}{16} + \frac{25}{16} = \frac{1}{16}$$

$$x - \frac{5}{4} = \pm \sqrt{\frac{1}{16}} = \pm \frac{1}{4}$$

$$x = \frac{5}{4} \pm \frac{1}{4} \quad \boxed{x = \left\{\frac{3}{2}, 1\right\}}$$

CK
 $x = \frac{3}{2}$

$$2\left(\frac{9}{4}\right) - 5\left(\frac{3}{2}\right) + 3 \stackrel{?}{=} 0$$

$$\frac{9}{2} - \frac{15}{2} + \frac{6}{2} \stackrel{?}{=} 0 \checkmark$$

CK
 $x = 1$

$$2(1)^2 - 5(1) + 3 \stackrel{?}{=} 0 \checkmark$$

PX 6
PG 309
D

$$x^2 + 4x + 11 = 0$$

$$x^2 + 4x + 4 = -11 + 4$$

$$(x+2)^2 = -7$$

$$x+2 = \pm\sqrt{-7} = \pm(-i\sqrt{7}) = \pm i\sqrt{7}$$

$$\boxed{x = -2 \pm i\sqrt{7}} \quad \text{or} \quad \boxed{x = \{-2 + i\sqrt{7}, -2 - i\sqrt{7}\}}$$

SET NOTATION

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SET NOTATION

OK $x = -2 + i\sqrt{5}$

$$\{(-2+i\sqrt{5})^2\} + 4(-2+i\sqrt{5}) + 11 = 0$$

$$4 - \underline{4j\sqrt{7}} - 7 - 8 + \underline{4j\sqrt{7}} + 11 = 0$$
$$\quad \quad \quad \vee \qquad ?$$
$$-15 + 15 = 0 \checkmark$$

$$-15 + 15 = 0V$$

Since:

$$(-2 + i\sqrt{7})(-2 + i\sqrt{7})$$

$$4 - 2i\sqrt{7} - 2i\sqrt{7} + (i)^2 7$$

$$4 - 4i\sqrt{7} - 7$$

OK $x = -2 - i\sqrt{7}$

$$(-2-i\sqrt{7})^2 + 4(-2-i\sqrt{7}) + 11 = 0$$

$$4 + \underline{4i\sqrt{7}} - 7 - 8 - \underline{4i\sqrt{7}} + 11 \stackrel{?}{=} 0$$

$$-15 + 15 = 0 \quad \checkmark$$

Homework: Pg 311 # 32-36 Solve and Check