Lesson QF - 4

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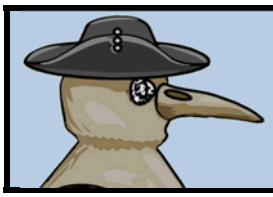
Objective: Completing the Square

Homework QF-4 – NYA p.582 #7 – 18, 22, 23

Do Now: Solve 1. $y = x^2 - 2x - 6$ $y = 4x + 10$

Exam Prep: A quadratic-linear system of equations has one solution.

A) Always True B) Sometimes True C) Never True



Completing the square is useful if you like it…

Completing the square is total crap if you don't like it.

Mr Buro dislikes completing the square.

Solving Quadratic Equations by Completing the Square

To complete the square, you add $\left(\frac{b}{2}\right)^2$ to both sides after moving the c value over to the empty side.

It will always factor to $(x + \frac{b}{2})^2$ or $(x + \frac{b}{2})^2$ and you can easily solve from there.

This also works when a ≠ 1, you will see in an example later how to modify it.

$x^2 - 12x = 4$		Complete the square ($b = -12$)
$x^2 - 12x + 36 = 4 + 36$		Add $\left(\frac{12}{2}\right)^2$ or 6^2 or 36
$x^2 - 12x + 36 = 40$		Factor the quadratic
$(x - 6)(x - 6) = 40$ or $(x - 6)^2 = 40$		Solve: square root of both sides
$x - 6 = \pm\sqrt{40}$		Split and Solve
$x - 6 = \sqrt{40}$	$x - 6 = -\sqrt{40}$	Find the roots
$x = 6 + \sqrt{40}$	$x = 6 - \sqrt{40}$	
Two Solutions		Two Solutions
$x = 6 + 2\sqrt{10}$	$x = 6 - 2\sqrt{10}$	Simplified radical solutions
$x \approx 6.325$	$x \approx -0.325$	or rounded decimals

Another Example	Complete the Square	Solve	
	$x^2 - 20x + 32 = 0$	$x - 10 = \pm\sqrt{68}$	
	$x^2 - 20x = -32$	$x - 10 = \pm 8.25$	
	$x^2 - 20x + 100 = -32 + 100$	$x - 10 \approx 8.25$	$x - 10 \approx -8.25$
	$x^2 - 20x + 100 = 68$	$x \approx 18.25$ or $x \approx 1.75$ Two Solutions	
	$(x - 10)^2 = 68$		

Practice

1. $w^2 + 6w - 5 = 0$

2. $x^2 - 10x = 11$

3. $p^2 - 12p + 11 = 0$

4. $q^2 - 22q = -71$

Example When a ≠ 1

1. $4y^2 + 8p - 36 = 0$ *Divide both sides by a first!