Present Thursday: #35, 52, 91

9:55 Molly Kas., Azjja, Katie, Megan, Katie, Alyssa Nei.
11:00 Emily New., Jordan, Kyle, Rebecca, Emma, Jamie Sag.

Homework:
Watch your email later today!

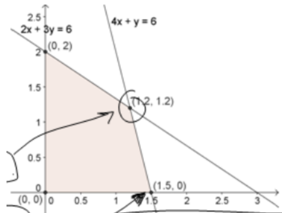
Present Monday: Watch your email later today!
9:55 Nicole Nie., Rachel, Hannah, Chelsea, Molly, Amy Sur.
11:00 Erin San., Jamie, Victoria, Abbey, Kelly, Jeffrey Ste.

Find the value of (x,y) that maximizes the equation $P = 10x + 3y$ subject to the constraints below.

① $-2(2x + 3y) \le (6)-2$ $x \ge 0$
② $4x + y \le 6$ $y \ge 0$

Find intersection:
①+② $\Rightarrow -5y = -6$
$\Rightarrow y = \frac{6}{5} = 1.2$
② $\Rightarrow 4x + 1.2 = 6$
$\Rightarrow 4x = 4.8$
$\Rightarrow x = 1.2$.
So $(x,y) = (1.2, 1.2)$.

Test vertex points:
$(0,2) \to P = 10(0) + 3(2) = 6$
$\boxed{(1.2,1.2) \to P = 10(1.2) + 3(1.2) = 15.6}$
$(1.5,0) \to P = 10(1.5) + 3(0) = 15$
$(0,0) \to P = 10(0) + 3(0) = 0$.



the point (1.2,1.2) maximizes the value of P given these constraints.

Which polynomials can be factored? Consider...

a) Can $3x^2 + 7x - 12$ be factored?
No.

b) List all integer values of b for which the trinomial $3x^2 + bx - 12$ can be factored.

$b \in \{\pm 35, \pm 16, \pm 9, \pm 5, 0\}$

$ac = -36$

35	(36)(−1)
16	(18)(−2)
9	(12)(−3)
5	(9)(−4)
0	(6)(−6)
−5	(4)(−9)
⋮	

The Common Factor Quotient (CFQ) Method of Factoring:

To factor $ax^2 + bx + c$ using the CFQ method:

1. The first step is to set up the following: $\frac{(ax \quad)(ax \quad)}{a}$
2. Find two factors of ac that have a sum of b. That is find e and f so that $ef = ac$, and $e + f = b$.
3. Place e and f as shown: $\frac{(ax+e)(ax+f)}{a}$
4. Check to see if there is anything that can be factored out of the parentheses in each of the 2 sets.
5. Reduce the fraction, if possible.

CFQ Example:

a) $6x^2 + 11x + 4$

$ac = 24 \ (= 6 \times 4)$
$(8)(3) = 24$, $8 + 3 = 11$

$= \frac{(6x+8)(6x+3)}{6}$

$= \frac{\cancel{2}(3x+4)\cancel{3}(2x+1)}{\cancel{6}}$

$= (3x+4)(2x+1)$

More practice: Use CFQ to factor the following trinomials.

c) $6x^2 + 1x - 2$ $\quad$ $ac = -12$

Target sum: 1

$(4)(-3) = -12,$

$4 + -3 = 1$

$$\frac{(6x+4)(6x-3)}{6}$$

$$\frac{\cancel{2}(3x+2)\,\cancel{3}(2x-1)}{\cancel{6}}$$

$$= (3x+2)(2x-1)$$

d) $4x^2 - 11x + 6$ $\quad$ $ac = (4)(6) = 24$

target sum $= -11$

$(-8)(-3) = 24$

$-8 + -3 = -11$

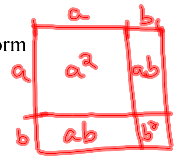
$$\frac{(4x-8)(4x-3)}{4}$$

$$= \frac{\cancel{4}(x-2)(4x-3)}{\cancel{4}}$$

$$= (x-2)(4x-3)$$

Completing the Square

Recall: A perfect square trinomial has the form $a^2 + 2ab + b^2$. $= (a+b)^2$



In the case where a = x, we have: $x^2 + 2bx + b^2$. $= (x+b)^2$

Example: Fill in the blank in the polynomial below so that it is a perfect square trinomial. Then factor it completely.

$x^2 + 12x + \_\_\_$

$x^2 + 2(6)x + \underline{6^2}$

$= x^2 + 12x + 36 = (x+6)^2$

Completing the Square

By "completing the square" in this way, we can **solve** certain quadratic equations.

Complete the square:

1. $x^2 + 8x + \underline{16} = (x+4)(x+4) = (x+4)^2$

need: $\frac{1}{2}$ of 8

b/c $8 = 2b \Rightarrow b = 4$

2. $x^2 + 5x + \underline{\frac{25}{4}} = \left(x + \frac{5}{2}\right)\left(x + \frac{5}{2}\right)$

$b = \frac{5}{2} = 2.5$

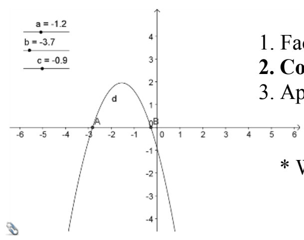
$b^2 = \frac{25}{4}$

$= x^2 + \frac{5}{2}x + \frac{5}{2}x + \frac{25}{4}$

$= x^2 + 5x + \frac{25}{4}$

Solving Quadratic Equations

Given a≠0 , b, and c, how can we find all x for which $ax^2 + bx + c = 0$?



Three methods:

1. Factor and use ZPP.
2. **Complete the square*.**
3. Apply the quadratic formula.

* We'll look at this method today.

Solving Quadratic Equations: Square Root Method

Warm-up:

(a) Calculate $\sqrt{25}$ $= 5$

(this is called the principal square root, and must be ≥ 0)

(b) Solve $x^2 = 25$. $\Rightarrow x = \pm\sqrt{25} = \pm 5$

(one solution is the principal square root of 25... the other solution is...)

Solving Quadratic Equations: Square Root Method

The SRP (square root principle) states:

If $x^2 = k$ and $k \geq 0$, then the two solutions are $x = \pm\sqrt{k}$.

Examples:

Solve: $x^2 - 25 = 0$ $\Rightarrow x^2 = 25$

$\Rightarrow x = \pm 5$

Solve: $(x + 3)^2 - 25 = 0$ $\Rightarrow (x+3)^2 = 25$

$\Rightarrow (x+3) = \pm 5$

$\Rightarrow x = -3 \pm 5$

$x = -3+5$ or $x = -3-5$

$x = 2$ or -8

Solving Quadratic Equations: Complete the Square

Solve by completing the square and using the square root principle:

A) $x^2 - 8x = 6$

$\Rightarrow x^2 - 8x + 16 = 6 + 16$

$\boxed{\begin{array}{l} b = \frac{1}{2}(-8) = -4 \\ b^2 = 16 \end{array}}$

$\Rightarrow (x + -4)^2 = 22$

$\Rightarrow x - 4 = \pm\sqrt{22}$

$\Rightarrow x = 4 \pm \sqrt{22}$

Solving Quadratic Equations: Complete the Square

Solve by completing the square and using the square root principle:

B) $2x^2 - x - 1 = 0$