

Section 1.5 as it relates to Writing Project #1 and big chunk of Test #1

Solve the equation by factoring, quadratic formula and completing the square.

$$\textcircled{1} x^2 - 5x - 14 = 0$$

Factoring

$$(1)(-14) = -14 \text{ Magic!}$$

$$-5 = -6 + 1 \quad -6$$

$$= -7 + 2 \quad -14 \text{ sweet!}$$

$$x^2 - 7x + 2x - 14$$

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

$$= (x-7)(x+2) = 0$$

$$x-7=0 \quad \text{OR} \quad x+2=0$$

$$x=7 \quad \text{OR} \quad x=-2$$

$$x \in \{-2, 7\}$$

Quadratic Formula

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

$$a=1, b=-5, c=-14$$

$$b^2 - 4ac = \text{Discriminant}$$

$$= (-5)^2 - 4(1)(-14)$$

$$= 25 + 56$$

$$= 81$$

$$x = \frac{-(-5) \pm \sqrt{81}}{2(1)} = \frac{5 \pm 9}{2} = \begin{cases} \frac{14}{2} = 7 \\ \frac{-4}{2} = -2 \end{cases}$$

$$x \in \{-2, 7\}$$

1.7 skills
every test.

$$-5^2 = -25$$

Quad. formula is a sledgehammer (cheat)
for factoring.

$$x = -2 \rightarrow (x - (-2)) = (x + 2)$$

$$x = 7 \rightarrow (x - 7)$$

$$\text{So } x^2 - 5x - 14 = (x - 7)(x + 2)$$

Completing the Square.

$$x^2 - 5x - 14 = 0$$

$$x^2 - 5x + \left(\frac{5}{2}\right)^2 = 14 + \frac{25}{4}$$

$$\frac{5}{2} \rightarrow \left(\frac{5}{2}\right)^2 = \frac{5^2}{2^2} = \frac{25}{4}$$

Power of quotient
is quotient of the powers.

Scratch:

$$\frac{14}{1} \cdot \frac{4}{4} + \frac{25}{4}$$

$$= \frac{56 + 25}{4}$$

$$= \frac{81}{4}$$

To see what we have, now:

OPTIONAL $x^2 - 5x + \left(\frac{5}{2}\right)^2 = \frac{81}{4}$

$$\left(x - \frac{5}{2}\right)^2 = \frac{81}{4}$$

$$\sqrt{\left(x - \frac{5}{2}\right)^2} = \sqrt{\frac{81}{4}}$$

$$\left|x - \frac{5}{2}\right| = \frac{\sqrt{81}}{\sqrt{4}} = \frac{9}{2}$$

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

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

$$x \in \{-2, 7\}$$

we've written the LHS as the square of a binomial.

$$\sqrt{x^2} =$$

$$\sqrt{3^2} = 3$$

$$\sqrt{(-3)^2} = -(-3)$$

$$\sqrt{9} = 3 =$$

$$f(x) = |x| = \begin{cases} \text{pos } x, & \text{if } x \text{ pos} \\ \text{neg } x, & \text{if } x \text{ neg} \end{cases}$$

$$\sqrt{*^2} = |*|$$

Completing Square, Done at Speed:

Scratch

$$x^2 - 5x - 14 = 0$$

$$x^2 - 5x + \left(\frac{5}{2}\right)^2 = 14 + \frac{25}{4} = \frac{81}{4}$$

$$\left(x - \frac{5}{2}\right)^2 = \frac{81}{4}$$

$$x - \frac{5}{2} = \pm \sqrt{\frac{81}{4}} = \pm \frac{9}{2}$$

$$x = \frac{5 \pm 9}{2} = \begin{cases} \frac{14}{2} = 7 \\ \frac{-4}{2} = -2 \end{cases}$$

$$x \in \{-2, 7\}$$

$$\frac{14 \cdot 4 + 25}{4} = \frac{56 + 25}{4}$$

$$\textcircled{2} \quad 2x^2 - 9x - 18 = 0$$

$$x^2 - \frac{9}{2}x = 9$$

$$x^2 - \frac{9}{2}x + \left(\frac{9}{4}\right)^2 = 9 + \frac{81}{16}$$

$$\left(x - \frac{9}{4}\right)^2 = \frac{144}{16} + \frac{81}{16}$$

$$= \frac{225}{16}$$

$$x - \frac{9}{4} = \pm \frac{15}{4}$$

$$x = \frac{9 \pm 15}{4}$$

$$x \in \left\{6, -\frac{3}{2}\right\}$$