

# Chapter 3 whiteboarding Review

1. Solve by factoring.

a)  $\frac{1}{4}x^2 + \frac{1}{2}x - 6 = 0$

$$\frac{1}{4}x^2 + \frac{2}{4}x - \frac{24}{4} = 0$$

$$\frac{1}{4}(x^2 + 2x - 24) = 0$$

$$\frac{1}{4}(x+6)(x-4) = 0$$

$$\boxed{x = -6} \quad \boxed{x = 4}$$

b)  $18x^2 - \frac{1}{2} = 0$

$$\frac{36}{2}x^2 - \frac{1}{2} = 0$$

$$\frac{1}{2}(36x^2 - 1) = 0$$

$$\frac{1}{2}(6x+1)(6x-1) = 0$$

$$\boxed{x = -\frac{1}{6}} \quad \boxed{x = \frac{1}{6}}$$

c)  $0.5x^2 - 5.4x + 4 = 0 \xrightarrow{\times 10} 5x^2 - 54x + 40 = 0$

$$5x^2 - 54x + 40 = 0$$

$$5x^2 - 50x - 4x + 40 = 0$$

$$5x(x-10) - 4(x-10) = 0$$

$$(5x-4)(x-10) = 0$$

$$\boxed{x = \frac{4}{5}} \quad \boxed{x = 10}$$

$$\begin{array}{r} 5(40) = 200 \\ -50 \quad -4 \end{array}$$

d)  $(x^2+4x)^2 - (x^2+4x) - 20 = 0$

Let  $a = x^2+4x$

$$a^2 - a - 20 = 0$$

$$(a-5)(a+4) = 0$$

$$[(x^2+4x)-5][(x^2+4x)+4] = 0$$

$$(x^2+4x-5)(x^2+4x+4) = 0$$

$$(x+5)(x-1)(x+2)(x+2) = 0$$

$$\boxed{x = -5} \quad \boxed{x = 1} \quad \boxed{x = -2}$$

2. Write a quadratic equation with the given roots.

a) 2, -3

$$x = 2 \quad x = -3$$

$$x-2 = 0 \quad x+3 = 0$$

$$(x-2)(x+3) = 0$$

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

$$\boxed{x^2 + x - 6 = 0}$$

b)  $-\frac{1}{2}, 5$

$$x = -\frac{1}{2} \quad x = 5$$

$$x-5 = 0$$

$$2x = -1$$

$$2x+1 = 0$$

$$(2x+1)(x-5) = 0$$

$$2x^2 - 10x + x - 5 = 0$$

$$\boxed{2x^2 - 9x - 5 = 0}$$

d) 5

$$x = 5 \quad x = 5$$

$$x-5 = 0 \quad x-5 = 0$$

$$(x-5)(x-5) = 0$$

$$x^2 - 5x - 5x + 25 = 0$$

$$\boxed{x^2 - 10x + 25 = 0}$$

c)  $0, \frac{1}{4}$

$$x = 0 \quad x = \frac{1}{4}$$

$$x+0 = 0 \quad 4x = 1$$

$$4x-1 = 0$$

$$x(4x-1) = 0$$

$$\boxed{4x^2 - x = 0}$$

3. Solve by factoring, completing the square or using the quadratic formula.

a)  $2x(x+4) = -6$

$4(\frac{1}{2}) = 2$   
 $\hookrightarrow 2^2 = 4$

$\frac{2x^2 + 8x + 6 = 0}{2}$

$x^2 + 4x + 3 = 0$

$(x^2 + 4x + 4) - 4 + 3 = 0$

$(x+2)^2 - 1 = 0$

$\sqrt{(x+2)^2} = \sqrt{1}$

$x+2 = \pm\sqrt{1}$

$x = -2 \pm 1$   
 $\downarrow$   $\downarrow$   
 $x = -3$   $x = -1$

b)  $x(x-6) = 2(x-8)$

$x^2 - 6x = 2x - 16$

$x^2 - 8x + 16 = 0$

$x = 4$

c)  $\sqrt{31-x} = x-1$

$(\sqrt{31-x})^2 = (x-1)^2$

$31-x = (x-1)(x-1)$

$31-x = x^2 - x - x + 1$

$31-x = x^2 - 2x + 1$

$-31 + x \quad +x \quad -31$

$0 = x^2 - x - 30$

$0 = (x-6)(x+5)$

$x = 6$   $x = -5$

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

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

$4x^2 - 2x - 2x + 1 - 3 = x^2 - 3x + 2$

$4x^2 - 4x - 2 - x^2 + 3x - 2 = 0$

$3x^2 - x - 4 = 0$

$a=3 \quad b=-1 \quad c=-4$

$x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(3)(-4)}}{2(3)}$

$x = \frac{1 \pm \sqrt{49}}{6} \rightarrow x = 4/3, x = -1$

4. Find the value of the discriminant and use it to determine the number of solutions.

$b^2 - 4ac$

a)  $4x^2 + 8x + 12 = 0$

$a=4 \quad b=8 \quad c=12$

$b^2 - 4ac$

$= 8^2 - 4(4)(12)$

$= 64 - 192$

$= -128$

$\uparrow$  negative  
 $\therefore$  no roots!

b)  $3x^2 - 5x + 6 = 0$

$a=3 \quad b=-5 \quad c=6$

$b^2 - 4ac$

$= (-5)^2 - 4(3)(6)$

$= 25 - 72$

$= -47$

$\uparrow$  negative  
 $\therefore$  no roots!

c)  $x^2 + 4x - 1 = 0$

$a=1 \quad b=4 \quad c=-1$

$b^2 - 4ac$

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

$= 16 + 4$

$= 20$

$\uparrow$  positive  
 $\therefore$  2 roots