Algebra 2 // Topic 4 // Practice 1

quadratic formula $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $\quad ax^2+bx+c=0$

1 $x^2-3x-1=0$

$a=1, b=-3, c=-1$

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

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

$x = \frac{3 \pm \sqrt{13}}{2}$

$+ \quad x = \frac{3}{2} + \frac{\sqrt{13}}{2}$

$- \quad x = \frac{3}{2} - \frac{\sqrt{13}}{2}$

2 $x^2+7x=1$

$-1 \quad -1$

$x^2+7x-1=0$

$a=1 \quad b=7 \quad c=-1$

$x = \frac{-7 \pm \sqrt{(7)^2-4(1)(-1)}}{2(1)}$

$= \frac{-7 \pm \sqrt{49+4}}{2} = \frac{-7 \pm \sqrt{53}}{2}$

$x = \frac{-7}{2} + \frac{\sqrt{53}}{2}$ $\qquad$ $x = \frac{-7}{2} - \frac{\sqrt{53}}{2}$

3 $2x^2-x-5=0$

$a=2, b=-1, c=-5$

$x = \frac{-(-1) \pm \sqrt{(-1)^2-4(2)(-5)}}{2(2)}$

$= \frac{1 \pm \sqrt{1+40}}{4} = \frac{1 \pm \sqrt{41}}{4}$

$x = \frac{1}{4} + \frac{\sqrt{41}}{4}$ $\qquad$ $x = \frac{1}{4} - \frac{\sqrt{41}}{4}$

4 $x^2-4x=-4$

$+4 \quad +4$

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

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

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

$= \frac{4 \pm \sqrt{16-16}}{2} = \frac{4 \pm \sqrt{0}}{2}$

$= \frac{4 \pm 0}{2}$

$x=2$

$\sqrt{0}=0$

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

$\hookrightarrow a=1 \quad b=-2 \quad c=-5$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(1)(-5)}}{2(1)}$$

$$= \frac{2 \pm \sqrt{4+20}}{2} = \frac{2 \pm \sqrt{24}}{2}$$

$$= \frac{2}{2} \pm \frac{2\sqrt{6}}{2}$$

$\sqrt{24} \rightarrow \sqrt{4}\cdot\sqrt{6} \rightarrow 2\sqrt{6}$

$x = 1 + \sqrt{6}$ $\qquad$ $x = 1 - \sqrt{6}$

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

$\hookrightarrow a=3 \quad b=1 \quad c=6$

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(3)(6)}}{2(3)}$$

$$= \frac{-1 \pm \sqrt{1-72}}{6}$$

$$= \frac{-1 \pm \sqrt{-71}}{6}$$

no real solution

7 $3x^2 = 2x + 6$

$-2x - 6 \quad -2x - 6$

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

$\hookrightarrow a=3 \quad b=-2 \quad c=-6$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-6)}}{2(3)}$$

$$= \frac{2 \pm \sqrt{4+72}}{6}$$

$$= \frac{2 \pm \sqrt{76}}{6}$$

$$= \frac{2}{6} \pm \frac{2\sqrt{19}}{6}$$

$$= \frac{1}{3} \pm \frac{\sqrt{19}}{3}$$

$\sqrt{76} \rightarrow \sqrt{4}\ \sqrt{19}$

$x = \frac{1}{3} + \frac{\sqrt{19}}{3}$ $\qquad$ $x = \frac{1}{3} - \frac{\sqrt{19}}{3}$

8 $x^2 = 3x$

$-3x \quad -3x$

$x^2 - 3x = 0$

$\hookrightarrow a=1 \quad b=-3 \quad c=0$

$$x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(0)}}{2(1)}$$

$$= \frac{3 \pm \sqrt{9-0}}{2} = \frac{3 \pm \sqrt{9}}{2}$$

$$= \frac{3 \pm 3}{2}$$

$x = \frac{6}{2}$ $\qquad$ $x = \frac{0}{2}$

$x = 3$ $\qquad$ $x = 0$

9 $3x^2+2x-4 = x^2+9x-8$

$-x^2-9x+5 \quad -x^2-9x+5$

$2x^2-7x+1=0$

$a=2 \quad b=-7 \quad c=1$

$$x = \frac{-(-7) \pm \sqrt{(-7)^2-4(2)(1)}}{2(2)}$$

$$= \frac{7 \pm \sqrt{49-8}}{4}$$

$$= \frac{7 \pm \sqrt{41}}{4}$$

$x = \frac{7}{4} + \frac{\sqrt{41}}{4}$ $\quad$ $x = \frac{7}{4} - \frac{\sqrt{41}}{4}$

10 $2x^2-5=0$

$a=2 \quad b=0 \quad c=-5$

$$x = \frac{-0 \pm \sqrt{0^2-4(2)(-5)}}{2(2)}$$

$$= \frac{0 \pm \sqrt{0+40}}{4}$$

$$= \frac{\pm 2\sqrt{10}}{4}$$

$\sqrt{40}$ → $\sqrt{4}\ \sqrt{10}$ → $2\sqrt{10}$

$x = \frac{+2\sqrt{10}}{4} = \frac{\sqrt{10}}{2}$ $\quad$ $x = \frac{-2\sqrt{10}}{4} = \frac{-\sqrt{10}}{2}$

11 $2x^2-6x+1=0$

$a=2 \quad b=-6 \quad c=1$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2-4(2)(1)}}{2(2)}$$

$$= \frac{6 \pm \sqrt{36-8}}{4}$$

$$= \frac{6 \pm \sqrt{28}}{4}$$

$$= \frac{6}{4} \pm \frac{2\sqrt{7}}{4}$$

$$= \frac{3}{2} \pm \frac{\sqrt{7}}{2}$$

$\sqrt{28}$ → $\sqrt{4}\ \sqrt{7}$ → $2\sqrt{7}$

$x = \frac{3}{2} + \frac{\sqrt{7}}{2}$ $\quad$ $x = \frac{3}{2} - \frac{\sqrt{7}}{2}$

12 $x^2+2x = -8$

$+8 \quad +8$

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

$a=1 \quad b=2 \quad c=8$

$$x = \frac{-2 \pm \sqrt{(2)^2-4(1)(8)}}{2(1)}$$

$$= \frac{-2 \pm \sqrt{4-32}}{2}$$

$$= \frac{-2 \pm \sqrt{-28}}{2}$$

No Real Solution