Completing the Square $a \neq 1$ Day 2

p260 8-13, 32-43, 58

Key

(8) $x^2+2x-8=0$

$x^2+2x=8$

$x^2+2x+1=8+1$

$\sqrt{(x+1)^2}=\sqrt{9}$

$x+1=\pm 3$

$-1 \quad -1$

$\boxed{x=2,-4}$

(9) $x^2-4x+9=0$

$x^2-4x=-9$

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

$\sqrt{(x-2)^2}=\sqrt{-5}$

$x-2=\pm i\sqrt{5}$

$+2 \quad +2$

$\boxed{x=2\pm i\sqrt{5}}$

(10) $2x^2-3x-3=0$

$2x^2-3x=3$

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

$2(x^2-\frac{3}{2}x+\frac{9}{16})=3+\frac{9}{8}$

$\frac{2(x-\frac{3}{4})^2}{2}=\frac{\frac{33}{8}}{2}$

$\sqrt{(x-\frac{3}{4})^2}=\sqrt{\frac{33}{16}}$

$x-\frac{3}{4}=\pm\frac{\sqrt{33}}{4}$

$+\frac{3}{4} \quad +\frac{3}{4}$

$\boxed{x=\frac{3}{4}\pm\frac{\sqrt{33}}{4} \text{ OR } x=\frac{3\pm\sqrt{33}}{4}}$

(11) $2x^2+6x-12=0$

$2x^2+6x=12$

$2(x^2+3x)=12$

$2(x^2+3x+\frac{9}{4})=12+\frac{9}{2}$

$\frac{2(x+\frac{3}{2})^2}{2}=\frac{\frac{33}{2}}{2}$

$\sqrt{(x+\frac{3}{2})^2}=\sqrt{\frac{33}{4}}$

$x+\frac{3}{2}=\pm\frac{\sqrt{33}}{2}$

$-\frac{3}{2} \quad -\frac{3}{2}$

$\boxed{x=-\frac{3}{2}\pm\frac{\sqrt{33}}{2} \text{ OR } \frac{-3\pm\sqrt{33}}{2}}$

(12) $x^2+4x+6=0$

$x^2+4x=-6$

$x^2+4x+4=-6+4$

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

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

$-2 \quad -2$

$\boxed{x=-2\pm i\sqrt{2}}$

(13) $x^2+8x+10=0$

$x^2+8x=-10$

$x^2+8x+16=-10+16$

$\sqrt{(x+4)^2}=\sqrt{6}$

$x+4=\pm\sqrt{6}$

$-4 \quad -4$

$\boxed{x=-4\pm\sqrt{6}}$

(32) $x^2+6x+8=0$

$x^2+6x=-8$

$x^2+6x+9=-8+9$

$\sqrt{(x+3)^2}=\sqrt{1}$

$x+3=\pm 1$

$-3\quad -3$

$\boxed{x=-2,-4}$

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

$x^2-4x=-3$

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

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

$x-2=\pm 1$

$+2\quad +2$

$\boxed{x=3,1}$

(34) $2x^2+x-3=0$

$2x^2+x=3$

$2(x^2+\frac{1}{2}x)=3$

$2(x^2+\frac{1}{2}x+\frac{1}{16})=3+\frac{1}{8}$

$\frac{2(x+\frac{1}{4})^2}{2}=\frac{\frac{25}{8}}{2}$

$\sqrt{(x+\frac{1}{4})^2}=\sqrt{\frac{25}{16}}$

$x+\frac{1}{4}=\pm\frac{5}{4}$

$-\frac{1}{4}\quad -\frac{1}{4}$

$\boxed{x=1,-\frac{3}{2}}$

(35) $2x^2-3x+5=0$

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

$2(x^2-\frac{3}{2}x)=-5$

$2(x^2-\frac{3}{2}x+\frac{9}{16})=-5+\frac{9}{8}$

$\frac{2(x-\frac{3}{4})^2}{2}=\frac{-\frac{31}{8}}{2}$

$\sqrt{(x-\frac{3}{4})^2}=\sqrt{-\frac{31}{16}}$

$x-\frac{3}{4}=\pm i\sqrt{\frac{31}{4}}$

$+\frac{3}{4}\quad +\frac{3}{4}$

$\boxed{x=\frac{3}{4}\pm i\sqrt{\frac{31}{4}}\ \text{OR}\ x=\frac{3\pm i\sqrt{31}}{4}}$

(36) $2x^2+5x+7=0$

$2x^2+5x=-7$

$2(x^2+\frac{5}{2}x)=-7$

$2(x^2+\frac{5}{2}x+\frac{25}{16})=-7+\frac{25}{8}$

$\frac{2(x+\frac{5}{4})^2}{2}=\frac{-\frac{31}{8}}{2}$

$\sqrt{(x+\frac{5}{4})^2}=\sqrt{-\frac{31}{16}}$

$x+\frac{5}{4}=\pm i\sqrt{\frac{31}{4}}$

$-\frac{5}{4}\quad -\frac{5}{4}$

$\boxed{x=-\frac{5}{4}\pm i\sqrt{\frac{31}{4}}\ \text{OR}\ x=\frac{-5\pm i\sqrt{31}}{4}}$

(37) $3x^2-6x-9=0$

$3x^2-6x=9$

$3(x^2-2x)=9$

$3(x^2-2x+1)=9+3$

$\frac{3(x-1)^2}{3}=\frac{12}{3}$

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

$x-1=\pm 2$

$+1 \quad +1$

$\boxed{x=3,-1}$

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

$x^2-2x=-3$

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

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

$x-1=\pm i\sqrt{2}$

$+1 \quad +1$

$\boxed{x=1\pm i\sqrt{2}}$

(39) $x^2+4x+11=0$

$x^2+4x=-11$

$x^2+4x+4=-11+4$

$\sqrt{(x+2)^2}=\sqrt{-7}$

$x+2=\pm i\sqrt{7}$

$-2 \quad -2$

$\boxed{x=-2\pm i\sqrt{7}}$

(40) $x^2-6x+18=0$

$x^2-6x=-18$

$x^2-6x+9=-18+9$

$\sqrt{(x-3)^2}=\sqrt{-9}$

$x-3=\pm 3i$

$+3 \quad +3$

$\boxed{x=3\pm 3i}$

(41) $x^2-10x+29=0$

$x^2-10x=-29$

$x^2-10x+25=-29+25$

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

$x-5=\pm 2i$

$+5 \quad +5$

$\boxed{x=5\pm 2i}$

(42) $3x^2-4x=2$

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

$3(x^2-\frac{4}{3}x+\frac{4}{9})=2+\frac{12}{9}$

$\frac{3(x-\frac{2}{3})^2}{3}=\frac{\frac{10}{3}}{3}$

$\sqrt{(x-\frac{2}{3})^2}=\sqrt{\frac{10}{9}}$

$x-\frac{2}{3}=\pm\frac{\sqrt{10}}{3}$

$+\frac{2}{3} \quad +\frac{2}{3}$

$\boxed{x=\frac{2}{3}\pm\frac{\sqrt{10}}{3} \quad \text{OR} \quad x=\frac{2\pm\sqrt{10}}{3}}$

(43) $2x^2 - 7x = -12$

$2(x^2 - \frac{7}{2}x) = -12$

$2(x^2 - \frac{7}{2}x + \frac{49}{16}) = -12 + \frac{98}{16}$

$\frac{2(x - \frac{7}{4})^2}{2} = -\frac{47}{8} \div 2$

$\sqrt{(x - \frac{7}{4})^2} = \sqrt{-\frac{47}{16}}$

$x - \frac{7}{4} = \pm i\frac{\sqrt{47}}{4}$

$+\frac{7}{4} \quad +\frac{7}{4}$

$$\boxed{x = \frac{7}{4} \pm i\frac{\sqrt{47}}{4} \text{ or } x = \frac{7 \pm i\sqrt{47}}{4}}$$

(58) Alonso is correct.
Aida did not add 116 to both sides

(59) $x^2 + bx + c = 0$

$x^2 + bx = -c$

$x^2 + bx + (\frac{b}{2})^2 = -c + (\frac{b}{2})^2$

$\sqrt{(x + \frac{b}{2})} = \sqrt{\frac{b^2}{4} - c}$

$x + \frac{b}{2} = \pm\sqrt{\frac{b^2}{4} - c}$

$$\boxed{x = -\frac{b}{2} \pm \sqrt{\frac{b^2}{4} - c}}$$

(67) $(8+5i)(8+5i)$

$64 + 40i + 40i + 25i^2$

$\boxed{39 + 80i}$

(68) $4(3-i) + 6(2-5i)$

$12 - 4i + 12 - 30i$

$\boxed{24 - 34i}$

(69) $\frac{5-2i}{6+9i} \cdot \frac{6-9i}{6-9i}$

$\frac{30 - 45i - 12i + 18i^2}{36 - 54i + 54i - 81i^2}$

$= \frac{12 - 57i}{117} = \boxed{\frac{4 - 19i}{39}}$