10.2 p613

① $x^2 + 10x$ completing the square

$b = 10$

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

$\left(\frac{b}{2}\right)^2 = 5^2$

$x^2 + 10x + 25$

$= \boxed{(x+5)^2}$

See Below for #2

③ $x^2 - 2x$ Completing Square

$b = -2$

$\frac{b}{2} = -\frac{2}{2}$

$\left(\frac{b}{2}\right)^2 = (-1)^2$

$x^2 - 2x + 1$

$+ \boxed{(x-1)^2}$

See Below for #4

See below for #6

⑤ $x^2 + 5x$ Completing square

$b = 5$

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

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

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

$= \boxed{\left(x + \frac{5}{2}\right)^2}$

⑦ $x^2 - 7x$ comp. square

$b = -7$

$\frac{b}{2} = -\frac{7}{2}$

$\left(\frac{b}{2}\right)^2 = \left(-\frac{7}{2}\right)^2$

$x^2 - 7x + \frac{49}{4}$

$+ \boxed{\left(x - \frac{7}{2}\right)^2}$

② $x^2 + 12x$ Completing Square

$b = 12$

$\frac{b}{2} = 6$

$\left(\frac{b}{2}\right)^2 = 36$

$x^2 + 12x + 36$

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

④ $x^2 - 4x$ completing square

$b = -4$

$\frac{b}{2} = -\frac{4}{2}$

$\left(\frac{b}{2}\right)^2 = (-2)^2$

$x^2 - 4x + 4$

$= \boxed{(x-2)^2}$

⑥ $x^2 + 3x$ Completing Square

$b = 3$

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

$\left(\frac{b}{2}\right)^2 = \left(\frac{3}{2}\right)^2$

$x^2 + 3x + \frac{9}{4}$

$= \boxed{\left(x + \frac{3}{2}\right)^2}$

⑧ $x^2 - x$ completing square

$b = -1$

$\frac{b}{2} = -\frac{1}{2}$

$\left(\frac{b}{2}\right)^2 = \left(-\frac{1}{2}\right)^2$

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

$= \boxed{\left(x - \frac{1}{2}\right)^2}$

10.2 p615

(9) $x^2+\frac{1}{2}x$ Complete square

$b=\frac{1}{2}$

$\frac{b}{2}=\frac{\frac{1}{2}}{2}$

$\left(\frac{b}{2}\right)^2=\left(\frac{1}{4}\right)^2$

$x^2+\frac{1}{2}x+\frac{1}{16}$

$=\left(x+\frac{1}{4}\right)^2$

(10) $x^2+\frac{1}{3}x$ Complete square

$b=\frac{1}{3}$

$\frac{b}{2}=\frac{\frac{1}{3}}{2}$

$\left(\frac{b}{2}\right)^2=\left(\frac{1}{6}\right)^2$

$x^2+\frac{1}{3}x+\frac{1}{36}$

$=\left(x+\frac{1}{6}\right)^2$

(11) $x^2-\frac{4}{3}x$ complete square

$b=-\frac{4}{3}$

$\frac{b}{2}=\frac{-\frac{4}{3}}{2}$

$\left(\frac{b}{2}\right)^2=\left(-\frac{4}{6}\right)^2$

$\left(\frac{b}{2}\right)^2=\left(-\frac{2}{3}\right)^2$

$x^2-\frac{4}{3}x+\frac{4}{9}$

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

(12) $x^2-\frac{4}{5}x$ $b=-\frac{4}{5}$ Complete square

$\frac{b}{2}=\frac{-\frac{4}{5}}{2}$

$\left(\frac{b}{2}\right)^2=\left(-\frac{4}{10}\right)^2$

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

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

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

(13) $x^2+4x=5$

$b=4$

$\left(\frac{b}{2}\right)=\frac{4}{2}$

$\left(\frac{b}{2}\right)^2=(2)^2$

$x^2+4x+4=5+4$

$(x+2)^2=9$

$\sqrt{(x+4)^2}=\pm\sqrt{9}$

$x+2=\pm 3$

$x=-2\pm 3$

$x=-5$ or $x=1$

$\{-5,1\}$

(14) $x^2+6x=-8$

$b=6$

$\frac{b}{2}=\frac{6}{2}$

$\left(\frac{b}{2}\right)^2=3^2$

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

$(x+3)^2=1$

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

$x+3=\pm 1$

$x=-3\pm 1$

$\{-4,-2\}$

10.2 p 613

(15) $x^2 - 10x = -24$

$b = -10$

$\frac{b}{2} = \frac{-10}{2}$

$\left(\frac{b}{2}\right)^2 = (-5)^2$

$x^2 - 10x + 25 = -24 + 25$

$(x-5)^2 = 1$

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

$x - 5 = \pm 1$

$x = 5 \pm 1$

$\{4, 6\}$

(16) $x^2 - 2x = 8$ $b = -2$

$\frac{b}{2} = \frac{-2}{2}$

$\left(\frac{b}{2}\right)^2 = (-1)^2$

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

$(x-1)^2 = 9$

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

$x - 1 = \pm 3$

$x = 1 \pm 3$

$\{-2, 4\}$

#18 see below

(17) $x^2 - 2x = 5$

$b = -2$

$\frac{b}{2} = \frac{-2}{2}$

$\left(\frac{b}{2}\right)^2 = (-1)^2$

$x^2 - 2x + 1 = 5 + 1$

$(x-1)^2 = 6$

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

$x - 1 = \pm\sqrt{6}$

$x = 1 \pm \sqrt{6}$

$\{1 \pm \sqrt{6}\}$

(18) $x^2 - 4x = -2$

$b = -4$

$\frac{b}{2} = \frac{-4}{2}$

$\left(\frac{b}{2}\right)^2 = (-2)^2$

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

$(x-2)^2 = 2$

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

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

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

$\{2 - \sqrt{2}, 2 + \sqrt{2}\}$

(19) $x^2 + 4x + 1 = 0$

$-1 \quad -1$

$x^2 + 4x = -1$

$b = 4$

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

$\left(\frac{b}{2}\right)^2 = (2)^2$

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

$(x+2)^2 = 3$

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

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

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

$\{-2 \pm \sqrt{2}\}$

(20) $x^2+6x-5=0$
$+5 \quad +5$

$x^2+6x = 5$

$b=6$

$\frac{b}{2}=\frac{6}{2}$

$\left(\frac{b}{2}\right)^2=(3)^2$

$x^2+6x+9=5+9$

$(x+3)^2=14$

$\sqrt{(x+3)^2}=\pm\sqrt{14}$

$x+3=\pm\sqrt{14}$

$x=-3\pm\sqrt{14}$

$\{-3-\sqrt{14},\ -3+\sqrt{14}\}$

(21) $x^2-3x=28$

$b=-3$

$\frac{b}{2}=-\frac{3}{2}$

$\left(\frac{b}{2}\right)^2=\left(-\frac{3}{2}\right)^2$

$x^2-3x+\frac{9}{4}=28+\frac{9}{4}$

$\left(x-\frac{3}{2}\right)^2=\frac{112}{4}+\frac{9}{4}$

$\sqrt{\left(x-\frac{3}{2}\right)^2}=\pm\sqrt{\frac{121}{4}}$

$x-\frac{3}{2}=\pm\frac{11}{2}$

$x=\frac{3}{2}\pm\frac{11}{2}$

$x=-\frac{8}{2}$ or $x=\frac{14}{2}$

$\{-4,\ 7\}$

(22) $x^2-5x=-6$

$b=-5$

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

$\left(\frac{b}{2}\right)^2=\left(-\frac{5}{2}\right)^2$

$x^2-5x+\frac{25}{4}=-6+\frac{25}{4}$

$\left(x-\frac{5}{2}\right)^2=-\frac{24}{4}+\frac{25}{4}$

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

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

$x=\frac{5}{2}\pm\frac{1}{2}$

$x=\frac{4}{2}$ or $x=\frac{6}{2}$

$\{2,\ 3\}$

(23) $x^2-5x=-6$

$b=-5$

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

$\left(\frac{b}{2}\right)^2=\left(-\frac{5}{2}\right)^2$

$x^2-5x+\frac{25}{4}=-6+\frac{25}{4}$

$\left(x-\frac{5}{2}\right)^2=-\frac{24}{4}+\frac{25}{4}$

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

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

$x=\frac{5}{2}\pm\frac{1}{2}$

$x=\frac{4}{2}$ or $x=\frac{6}{2}$

$\{2,\ 3\}$

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(23) $x^2+3x-1=0$

$b=3$

$x^2+3x=1$

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

$x^2+3x+\frac{9}{4}=1+\frac{9}{4}$

$\left(\frac{b}{2}\right)^2=\left(\frac{3}{2}\right)^2$

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

$\sqrt{\left(x+\frac{3}{2}\right)^2}=\pm\sqrt{\frac{13}{4}}$

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

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

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

$\boxed{\left\{\frac{-3-\sqrt{13}}{2}, \frac{-3+\sqrt{13}}{2}\right\}}$

(24) $x^2-3x-5=0$

$b=-3$

$x^2-3x=5$

$\frac{b}{2}=\frac{-3}{2}$

$x^2-3x+\frac{9}{4}=5+\frac{9}{4}$

$\left(\frac{b}{2}\right)^2=\left(\frac{-3}{2}\right)^2$

$\left(x-\frac{3}{2}\right)^2=\frac{20}{4}+\frac{9}{4}$

$\sqrt{\left(x-\frac{3}{2}\right)^2}=\pm\sqrt{\frac{29}{4}}$

$x-\frac{3}{2}=\pm\frac{\sqrt{29}}{2}$

$x=\frac{3}{2}\pm\frac{\sqrt{29}}{2}$

$x=\frac{3\pm\sqrt{29}}{2}$

$\boxed{\left\{\frac{3\pm\sqrt{29}}{2}\right\}}$

(25) $x^2=7x-3$

$-7x \quad -7x$

$x^2-7x=-3$

$b=-7$

$\frac{b}{2}=-\frac{7}{2}$

$\left(\frac{b}{2}\right)^2=\left(-\frac{7}{2}\right)^2$

$x^2-7x+\frac{49}{4}=-3+\frac{49}{4}$

$\left(x-\frac{7}{2}\right)^2=-\frac{12}{4}+\frac{49}{4}$

$\sqrt{(x-\frac{7}{2})^2}=\pm\sqrt{\frac{37}{4}}$

$x-\frac{7}{2}=\pm\frac{\sqrt{37}}{2}$

$x=\frac{7}{2}\pm\frac{\sqrt{37}}{2}$

(26) $x^2=5x-3$

$x^2-5x=3$

$b=-5$

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

$\left(\frac{b}{2}\right)^2=\left(\frac{-5}{2}\right)^2$

$x^2-5x+\frac{25}{4}=\frac{25}{4}+3$

$\left(x-\frac{5}{2}\right)^2=\frac{25}{4}+\frac{12}{4}$

$\sqrt{(x-\frac{5}{2})^2}=\pm\sqrt{\frac{37}{4}}$

$x-\frac{5}{2}=\pm\frac{\sqrt{37}}{2}$

$x=\frac{5}{2}\pm\frac{\sqrt{37}}{2}$

$\boxed{\left\{\frac{5\pm\sqrt{37}}{2}\right\}}$

$x=\frac{7\pm\sqrt{37}}{2}$

$\boxed{\left\{\frac{7\pm\sqrt{37}}{2}\right\}}$

10.2 p611

(27) $2x^2 - 2x - 6 = 0$

$\frac{2(x^2 - x - 3)}{2} = \frac{0}{2}$

$b = -1$, $\frac{b}{2} = -\frac{1}{2}$, $\left(\frac{b}{2}\right)^2 = \left(-\frac{1}{2}\right)^2$

$x^2 - x - 3 = 0$

$x^2 - x = 3$

$x^2 - x + \frac{1}{4} = 3 + \frac{1}{4}$

$\left(x - \frac{1}{2}\right)^2 = \frac{12}{4} + \frac{1}{4}$

$\sqrt{\left(x - \frac{1}{2}\right)^2} = \pm\sqrt{\frac{13}{4}}$

$x - \frac{1}{2} = \pm\frac{\sqrt{13}}{2}$

$x = \frac{1}{2} \pm \frac{\sqrt{13}}{2}$

$\left\{\frac{1 \pm \sqrt{13}}{2}\right\}$

(28) $2x^2 - 4x - 2 = 0$

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

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

$x^2 - 2x = 1$

$b = -2$, $\frac{b}{2} = -\frac{2}{2}$, $\left(\frac{b}{2}\right)^2 = (-1)^2$

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

$(x - 1)^2 = 2$

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

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

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

$\{1 \pm \sqrt{2}\}$

(29) $\frac{2x^2}{2} - \frac{3}{2}x + \frac{1}{2} = \frac{0}{2}$

$x^2 - \frac{3}{2}x + \frac{1}{2} = 0$

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

$b = -\frac{3}{2}$, $\frac{b}{2} = -\frac{3}{4}$, $\left(\frac{b}{2}\right)^2 = \left(-\frac{3}{4}\right)^2$

$+\frac{9}{16} \quad +\frac{9}{16}$

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

$\left(x - \frac{3}{4}\right)^2 = \frac{1}{16}$

$\sqrt{\left(x - \frac{3}{4}\right)^2} = \pm\sqrt{\frac{1}{16}}$

$x - \frac{3}{4} = \pm\frac{1}{4}$

$x = \frac{3}{4} \pm \frac{1}{4}$

$\left\{\frac{1}{2}, 1\right\}$

(30) $2x^2 - x - 1 = 0$

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

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

$b = -\frac{1}{2}$, $\frac{b}{2} = -\frac{1}{4}$, $\left(\frac{b}{2}\right)^2 = \left(-\frac{1}{4}\right)^2$

$x^2 - \frac{1}{2}x + \frac{1}{16} = \frac{1}{2} + \frac{1}{16}$

$\left(x - \frac{1}{4}\right)^2 = \frac{8}{16} + \frac{1}{16}$

$\sqrt{\left(x - \frac{1}{4}\right)^2} = \pm\sqrt{\frac{9}{16}}$

$x - \frac{1}{4} = \pm\frac{3}{4}$

$x = \frac{1}{4} \pm \frac{3}{4}$

$x = -\frac{2}{4}$ or $x = \frac{4}{4}$

$\left\{-\frac{1}{2}, 1\right\}$

10.2 p613

(31) $\frac{2x^2}{2} + \frac{10x}{2} + \frac{11}{2} = \frac{0}{2}$

$b = 5$

$x^2 + 5x + \frac{11}{2} = 0$

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

$x^2 + 5x = -\frac{11}{2}$

$\left(\frac{b}{2}\right)^2 = \left(\frac{5}{2}\right)^2$

$x^2 + 5x + \frac{25}{4} = -\frac{11}{2} + \frac{25}{4}$

$\left(x + \frac{5}{2}\right)^2 = -\frac{22}{4} + \frac{25}{4}$

$\sqrt{\left(x + \frac{5}{2}\right)^2} = \pm\sqrt{\frac{3}{4}}$

$x + \frac{5}{2} = \pm\frac{\sqrt{3}}{2}$

$x = -\frac{5}{2} \pm \frac{\sqrt{3}}{2}$

$\left\{\frac{-5 \pm \sqrt{3}}{2}\right\}$

(32) $\frac{2x^2}{2} + \frac{8x}{2} + \frac{5}{2} = \frac{0}{2}$

$x^2 + 4x + \frac{5}{2} = 0$

$b = 4$

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

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

$\left(\frac{b}{2}\right)^2 = (2)^2$

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

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

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

$x + 2 = \pm\frac{\sqrt{3}}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right)$

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

$x = -2\left(\frac{2}{2}\right) \pm \frac{\sqrt{6}}{2}$

$x = \frac{-4}{2} \pm \frac{\sqrt{6}}{2}$

$= \left\{\frac{-4 \pm \sqrt{6}}{2}\right\}$

10.2 p613

(33) $\frac{4x^2}{4} - \frac{2x}{4} - \frac{3}{4} = \frac{0}{4}$

$x^2 - \frac{1}{2}x - \frac{3}{4} = 0$

$b = -\frac{1}{2}$

$\frac{b}{2} = -\frac{1}{4}$

$x^2 - \frac{1}{2}x \quad = \frac{3}{4}$

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

$x^2 - \frac{1}{2}x + \frac{1}{16} = \frac{3}{4} + \frac{1}{16}$

$\left(\frac{b}{2}\right)^2 = \left(-\frac{1}{4}\right)^2$

$\left(x - \frac{1}{4}\right)^2 = \frac{12}{16} + \frac{1}{16}$

$\sqrt{\left(x - \frac{1}{4}\right)^2} = \pm\sqrt{\frac{13}{16}}$

$x - \frac{1}{4} = \pm\frac{\sqrt{13}}{4}$

$x = \frac{1}{4} \pm \frac{\sqrt{13}}{4}$

$\left\{\frac{1 \pm \sqrt{13}}{4}\right\}$

(34) $\frac{3x^2}{3} - \frac{2x}{3} - \frac{4}{3} = \frac{0}{3}$

$b = -\frac{2}{3}$

$x^2 - \frac{2}{3}x - \frac{4}{3} = 0$

$\frac{b}{2} = -\frac{2}{6}$

$= -\frac{1}{3}$

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

$\left(\frac{b}{2}\right)^2 = \left(-\frac{1}{3}\right)^2$

$x^2 - \frac{2}{3}x + \frac{1}{9} = \frac{4}{3} + \frac{1}{9}$

$\left(x - \frac{1}{3}\right)^2 = \frac{12}{9} + \frac{1}{9}$

$\left(x - \frac{1}{3}\right)^2 = \frac{13}{9}$

$\sqrt{\left(x - \frac{1}{3}\right)^2} = \pm\sqrt{\frac{13}{9}}$

$x - \frac{1}{3} = \pm\frac{\sqrt{13}}{3}$

$x = \frac{1}{3} \pm \frac{\sqrt{13}}{3}$

$\left\{\frac{1 \pm \sqrt{13}}{3}\right\}$

10.2 p613

(35) $\frac{x^2}{6} - \frac{x}{3} - 1 = 0$

$6\left(\frac{x^2}{6}\right) - 6\left(\frac{x}{3}\right) - 6(1) = 6(0)$

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

$x^2 - 2x = 6$

$b = -2$

$\frac{b}{2} = \frac{-2}{2}$

$\left(\frac{b}{2}\right)^2 = (-1)^2$

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

$(x-1)^2 = 7$

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

$x - 1 = \pm\sqrt{7}$

$x = 1 \pm \sqrt{7}$

$\{1 \pm \sqrt{7}\}$