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1 (i) $x^2 + 8x + 12$ (ii) $x^2 - 10x + 28$ (iii) $2x^2 - 4x - 1$
 (iv) $2x^2 + 2x + 1$ (v) $5x^2 - \frac{15}{2}x + \frac{37}{16}$

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2 (i) $-2, -6$ (ii) no real solutions (iii) $1 \pm \sqrt{\frac{3}{2}}$
 (iv) no real solutions (v) $\frac{3}{4} \pm \sqrt{\frac{1}{10}}$

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3 (i) $(x + 4)^2 - 19$ (ii) $(x - 3)^2$ (iii) $(x - 5)^2 - 20$
 (iv) $(x + 5)^2 - 25$ (v) $\left(x + \frac{5}{2}\right)^2 - \frac{53}{4}$ (vi) $\left(x - \frac{7}{2}\right)^2 - \frac{25}{4}$
 (vii) $\left(x + \frac{11}{2}\right)^2 - \frac{125}{4}$ (viii) $\left(x - \frac{13}{2}\right)^2 - \frac{169}{4}$ (ix) $(x + 0)^2 - 3$

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4 (i) $-4 \pm \sqrt{19}$ (ii) 3 (iii) $5 \pm 2\sqrt{5}$
 (iv) $-10, 0$ (v) $-\frac{5}{2} \pm \frac{\sqrt{53}}{2}$ (vi) $1, 6$
 (vii) $\frac{-11 \pm 5\sqrt{5}}{2}$ (viii) $0, 13$ (ix) $\pm\sqrt{3}$

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5 (i) $3(x + 1)^2 - 7; a = 3, b = 1, c = -7$
 (ii) $2\left(x - \frac{5}{4}\right)^2 + \frac{23}{8}; a = 2, b = -\frac{5}{4}, c = \frac{23}{8}$
 (iii) $-\left(x - \frac{3}{2}\right)^2 + \frac{1}{4}; a = -1, b = -\frac{3}{2}, c = \frac{1}{4}$
 (iv) $-5\left(x - \frac{3}{10}\right)^2 - \frac{291}{20}; a = -5, b = -\frac{3}{10}, c = -\frac{291}{20}$
 (v) $5\left(x + \frac{1}{5}\right)^2 - \frac{16}{5}; a = 5, b = \frac{1}{5}, c = -\frac{16}{5}$
 (vi) $7\left(x - \frac{1}{7}\right)^2 + \frac{6}{7}; a = 7, b = -\frac{1}{7}, c = \frac{6}{7}$
 (vii) $-2\left(x - \frac{5}{4}\right)^2 + \frac{33}{8}; a = -2, b = -\frac{5}{4}, c = \frac{33}{8}$
 (viii) $-4\left(x + \frac{1}{4}\right)^2 + \frac{13}{4}; a = -4, b = \frac{1}{4}, c = \frac{13}{4}$
 (ix) $-3\left(x - \frac{7}{6}\right)^2 + \frac{73}{12}; a = -3, b = -\frac{7}{6}, c = \frac{73}{12}$