22. $4y^2 + 4y + 8x = 15$

$-8x \quad -8x$

$4\left(y^2 + y + \frac{1}{4}\right) = -8x + 15 + 4\left(\frac{1}{4}\right)$

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

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

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

OR

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

① $9x^2 - 4y^2 = 36$

(-) $9x^2 + 9y^2 = 36$

$-13y^2 = 0$

$y^2 = 0$

$y = 0$

$9(x^2 + y^2 = 4)$

$x^2 + 0^2 = 4$

$x^2 = 4$

$x = \pm 2$

$(2, 0)$ $(-2, 0)$ OR $(\pm 2, 0)$

---

② $3x^2 - y^2 = 1$

$3(9 - 2y^2) - y^2 = 1$

$27 - 6y^2 - y^2 = 1$

$-7y^2 = -26$

$y^2 = \frac{26}{7}$

$y = \pm\sqrt{\frac{26}{7}}$

$y \approx \pm 1.9$

$x^2 + 2y^2 = 9$

$x^2 = 9 - 2y^2$

$x^2 = 9 - 2\left(\sqrt{\frac{26}{7}}\right)^2$

$x^2 = 1.6$

$x \approx \pm 1.3$

$(1.3, 1.9)$ $(-1.3, 1.9)$ $(1.3, -1.9)$ $(-1.3, -1.9)$

$(\pm 1.3, 1.9)$ $(\pm 1.3, -1.9)$

(3) ex. 1

$9x^2 + 25y^2 = 225$ $\quad 25(x^2 + y^2 - 2x = 15)$

$25x^2 + 25y^2 - 50x = 375$

$-(9x^2 + 25y^2 = 225)$

$16x^2 - 50x = 150$

$16x^2 - 50x - 150 = 0$

$$x = \frac{50 \pm \sqrt{(-50)^2 - 4(16)(-150)}}{2(16)}$$

$$x = \frac{50 \pm \sqrt{12,100}}{32} = \frac{50 \pm 110}{32} = 5, -1.875$$

$x^2 + y^2 - 2x = 15$

$x = 5$

$5^2 + y^2 - 2(5) = 15$

$y^2 + 15 = 15$

$y^2 = 0$

$y = 0$

$(5, 0)$

at $x = -1.875$

$(-1.875)^2 + y^2 - 2(-1.875) = 15$

$y^2 = 15 - 2(1.875) - 1.875^2$

$y^2 \approx 7.7$

$y \approx \pm 2.8$

$(-1.9, 2.8)$ $(-1.9, -2.8)$

OR

$(-1.9, \pm 2.8)$

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13, 15 or 16, 18,
21 or 22, 42b, 50