

HW Lesson 3 (part 2): Ellipse textbook p. 710 #15 – 21 odd

$$15. \quad 9x^2 + 4y^2 + 36x - 24y + 36 = 0$$

$$9(x^2 + 4x + 4) + 4(y^2 - 6y + 9) = -36 + 36 + 36$$

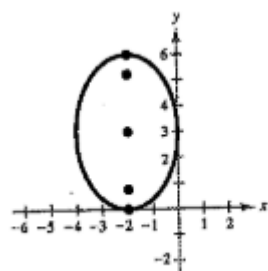
$$\frac{(x + 2)^2}{4} + \frac{(y - 3)^2}{9} = 1$$

$$a = 3, b = 2, c = \sqrt{5}$$

Center: $(-2, 3)$

Foci: $(-2, 3 \pm \sqrt{5})$

Vertices: $(-2, 6), (-2, 0)$



$$19. \quad 6x^2 + 2y^2 + 18x - 10y + 2 = 0$$

$$6\left(x^2 + 3x + \frac{9}{4}\right) + 2\left(y^2 - 5y + \frac{25}{4}\right) = -2 + \frac{27}{2} + \frac{25}{2}$$

$$6\left(x + \frac{3}{2}\right)^2 + 2\left(y - \frac{5}{2}\right)^2 = 24$$

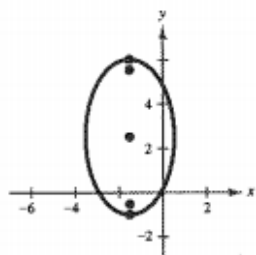
$$\frac{\left(x + \frac{3}{2}\right)^2}{4} + \frac{\left(y - \frac{5}{2}\right)^2}{12} = 1$$

Center: $\left(-\frac{3}{2}, \frac{5}{2}\right)$

$$a = 2\sqrt{3}, b = 2, c = 2\sqrt{2}$$

Foci: $\left(-\frac{3}{2}, \frac{5}{2} \pm 2\sqrt{2}\right)$

Vertices: $\left(-\frac{3}{2}, \frac{5}{2} \pm 2\sqrt{3}\right)$



$$17. \quad x^2 + 5y^2 - 8x - 30y - 39 = 0$$

$$(x^2 - 8x + 16) + 5(y^2 - 6y + 9) = 39 + 16 + 45$$

$$(x - 4)^2 + 5(y - 3)^2 = 100$$

$$\frac{(x - 4)^2}{100} + \frac{(y - 3)^2}{20} = 1$$

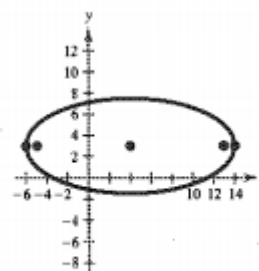
Center: $(4, 3)$

$$a = 10, b = 2\sqrt{5}, c = \sqrt{80} = 4\sqrt{5}$$

Foci: $(4 + 4\sqrt{5}, 3), (4 - 4\sqrt{5}, 3)$

Vertices: $(4 + 10, 3) = (14, 3)$

$(4 - 10, 3) = (-6, 3)$



$$21. \quad 16x^2 + 25y^2 - 32x + 50y + 16 = 0$$

$$16(x^2 - 2x + 1) + 25(y^2 + 2y + 1) = -16 + 16 + 25$$

$$\frac{(x - 1)^2}{25/16} + (y + 1)^2 = 1$$

$$a = \frac{5}{4}, b = 1, c = \frac{3}{4}$$

Center: $(1, -1)$

Foci: $\left(\frac{7}{4}, -1\right), \left(\frac{1}{4}, -1\right)$

Vertices: $\left(\frac{9}{4}, -1\right), \left(-\frac{1}{4}, -1\right)$

