

Sec. 8.6 Translate and Classify Conic Sections

Circle $(x-h)^2 + (y-k)^2 = r^2$
 center: (h, k)

H.A.
 Parabola $(y-k)^2 = 4p(x-h)$
 vertex: (h, k)

V.A.
 Parabola $(x-h)^2 = 4p(y-k)$

Ellipse $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$
 center: (h, k)

Ellipse $\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$

Hyperbola $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$
 center: (h, k)

Hyperbola $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$



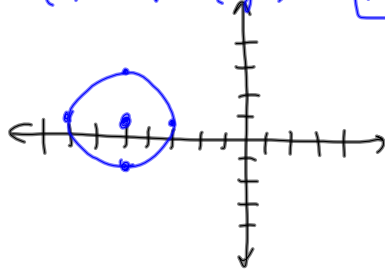
Graph the equation. Identify the important characteristics.

a. $(x+5)^2 + (y-1)^2 = 4$
 $(x-h)^2 + (y-k)^2 = r^2$

circle

center: $(-5, 1)$
 (h, k)

radius: 2



b. $(x-2)^2 = 8(y+3)$

parabola

vertex: $(2, -3)$

opens up

axis: $x=2$

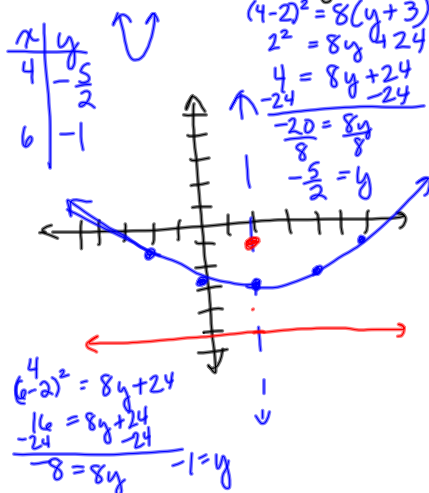
$4p=8$

$p=2$ distance from vertex to focus

focus: $(0, 2)$
 $(2, -3)$

$(2, -1)$

directrix: $y = -2$
 $y = -3$
 $y = 5$



$$c. \quad \frac{(x-2)^2}{16} + \frac{(y-1)^2}{9} = 1 \quad \text{ellipse}$$

\downarrow \downarrow
 4 3

center: $(2, 1)$

vertices: $(4, 0) (-4, 0)$
 $(2, 1) (2, 1)$

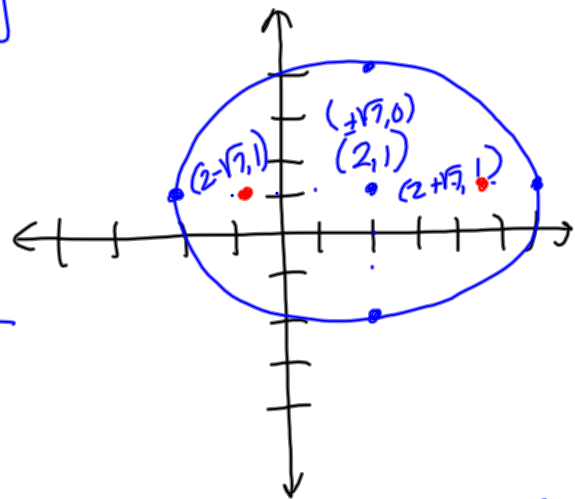
$(6, 1) (-2, 1)$

co-vertices: $(0, 3) (0, -3)$
 $(2, 1) (2, 1)$

$(2, 4) (2, -2)$

foci: $(-\sqrt{7}, 0) (\sqrt{7}, 0)$
 $(2, 1) (2, 1)$

$(2-\sqrt{7}, 1) (2+\sqrt{7}, 1)$



foci: $c^2 = a^2 - b^2$
 $c^2 = 16 - 9$
 $c^2 = 7$
 $c = \pm\sqrt{7}$

d. $\frac{(x+2)^2}{9} - \frac{(y-1)^2}{16} = 1$

right/left $\rightarrow 3$

hyperbola

$$c^2 = a^2 + b^2$$

$$c^2 = 9 + 16$$

$$c^2 = 25$$

$$c = 5$$

center: $(-2, 1)$

vertices: $(3, 0)$ $(-3, 0)$
 $(-2, 1)$ $(-2, 1)$
 $(1, 1)$ $(-5, 1)$

foci: $(5, 0)$ $(-5, 0)$
 $(-2, 1)$ $(-2, 1)$
 $(3, 1)$ $(-7, 1)$

$$m = \pm \frac{\Delta y}{\Delta x} = \pm \frac{4}{3} x$$

asymptotes: $y = \frac{4}{3}x + \frac{11}{3}$
 $y = -\frac{4}{3}x - \frac{5}{3}$

$$y = \frac{4}{3}x + b \quad (-2, 1)$$

$$1 = \frac{4}{3}(-2) + b$$

$$\frac{3}{3} = 1 = -\frac{8}{3} + b$$

$$\frac{+8}{3} \quad \frac{+8}{3}$$

$$\frac{11}{3} = b$$

$$y = -\frac{4}{3}x + b \quad (-2, 1)$$

$$1 = -\frac{4}{3}(-2) + b$$

$$\frac{3}{3} = 1 = \frac{8}{3} + b$$

$$\frac{-8}{3} \quad \frac{-8}{3}$$

$$-\frac{5}{3} = b$$

P. 531 (3 - 2i) odd