2) center $(-2,-8)$ $r=10$

$$(x-(-2))^2+(y-(-8))^2=(10)^2$$
$$(x+2)^2+(y+8)^2=100$$

---

4) center $(-1,5)$ passes $(-4,-6)$ $(x-h)^2+(y-k)^2=r^2$

(h,k) (x,y)

$$((-4)-(-1))^2+((-6)-(5))^2=r^2$$
$$(-3)^2+(-11)^2=r^2$$
$$9+121=r^2$$
$$130=r^2$$

$$(x-(-1))^2+(y-(5))^2=130$$
$$(x+1)^2+(y-5)^2=130$$

---

6) $x^2+y^2+6y+2=0$

$\frac{b_y}{2}=\frac{6}{2}=3$

$\left(\frac{b_y}{2}\right)^2=(3)^2=9$

$$x^2+y^2+6y=-2$$
$$(x-0)^2+(y^2+6y+9)=-2+(9)$$
$$(x-0)^2+(y+3)^2=7$$
$$(x-(0))^2+(y-(-3))^2=(\sqrt{7})^2$$

center: $(0,-3)$; $r=\sqrt{7}$

---

8) $16x^2+16y^2+8x+32y+1=0$

$\frac{b_x}{2}=\frac{\frac{1}{2}}{2}=\frac{1}{4}$ $\frac{b_y}{2}=\frac{2}{2}=1$

$\left(\frac{b_x}{2}\right)^2=\left(\frac{1}{4}\right)^2=\frac{1}{16}$ $\left(\frac{b_y}{2}\right)^2=(1)^2=1$

$$16x^2+8x+16y^2+32y=-1$$
$$16\left(x^2+\frac{1}{2}x+\frac{1}{16}\right)+16(y^2+2y+1)=-1+16\left(\frac{1}{16}\right)+16(1)$$
$$16\left(x+\frac{1}{4}\right)^2+16(y+1)^2=16$$
$$\left(x-\left(\frac{-1}{4}\right)\right)^2+(y-(-1))^2=1=(1)^2$$

center: $\left(\frac{-1}{4},-1\right)$; $r=1$

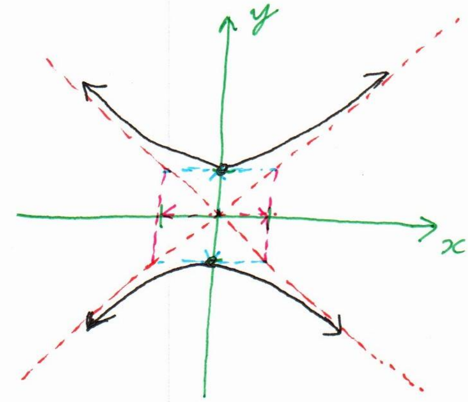
12) $y^2 - x^2 = 1$

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

hyperbola
opens on y-axis (vertically)

center: (0,0)

asymptotes: $y = \pm \frac{1}{1} x$



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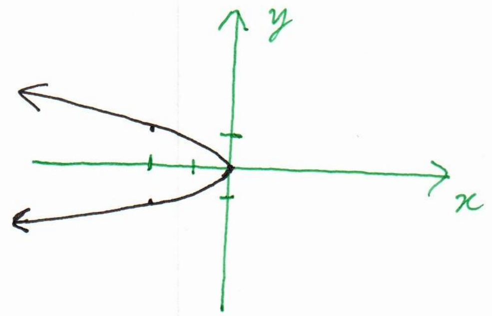
14) $x = -2y^2$

parabola
opens to $-x$ direction



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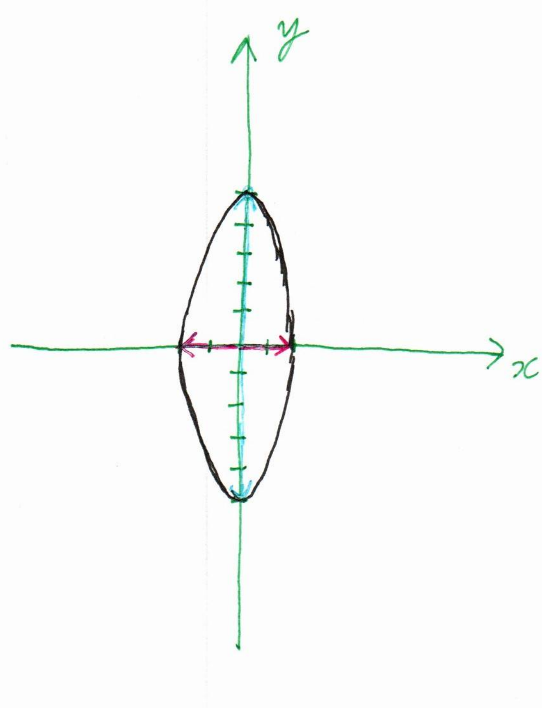
16) $25x^2 + 4y^2 = 100$

$$\frac{25x^2}{100} + \frac{4y^2}{100} = 1$$

$$\frac{x^2}{4} + \frac{y^2}{25} = 1$$

$$\frac{(y-0)^2}{(5)^2} + \frac{(x-0)^2}{(2)^2} = 1$$

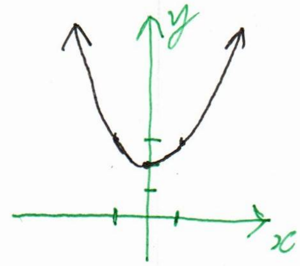
ellipse
longer side on y-axis (vertical)
center: (0,0)



18) $y = x^2 + 2$

parabola

opens to $+y$ direction



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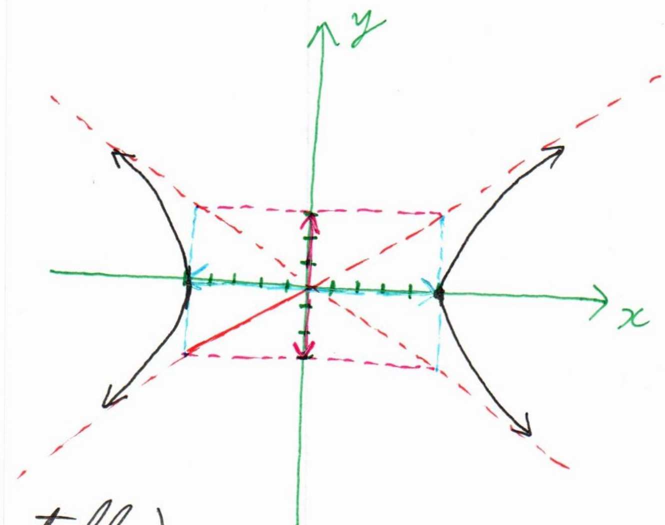
20) $9x^2 - 25y^2 = 225$

asymptote : $y = \pm \frac{3}{5} x$

$$\frac{9x^2}{225} - \frac{25y^2}{225} = 1$$

$$\frac{x^2}{25} - \frac{y^2}{9} = 1$$

$$\frac{(x-0)^2}{(5)^2} - \frac{(y-0)^2}{(3)^2} = 1$$



hyperbola

opens on x-axis (horizontally)

center: $(0, 0)$

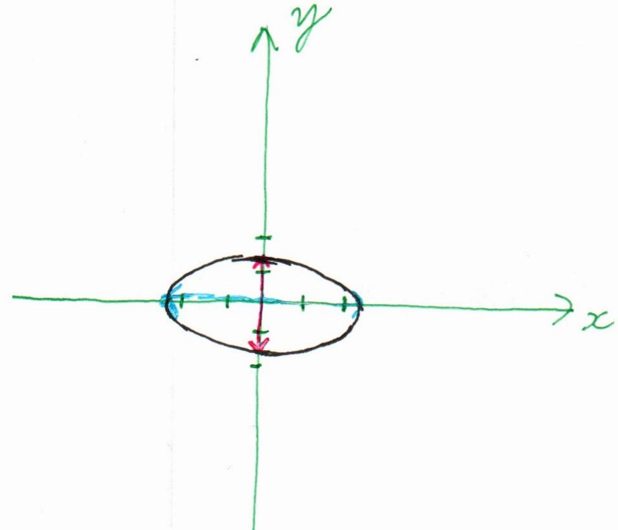
---

22) $2x^2 + 5y^2 = 10$ center: $(0,0)$

$$\frac{2x^2}{10} + \frac{5y^2}{10} = 1$$

$$\frac{x^2}{5} + \frac{y^2}{2} = 1$$

$$\frac{(x-0)^2}{(\sqrt{5})^2} + \frac{(y-0)^2}{(\sqrt{2})^2} = 1$$



ellipse

longer side on x-axis (horizontal)

24) $y = x^2 + 2x$

parabola

$\frac{b_x}{2} = \frac{2}{2} = 1 \quad \left(\frac{b_x}{2}\right)^2 = (1)^2 = 1$

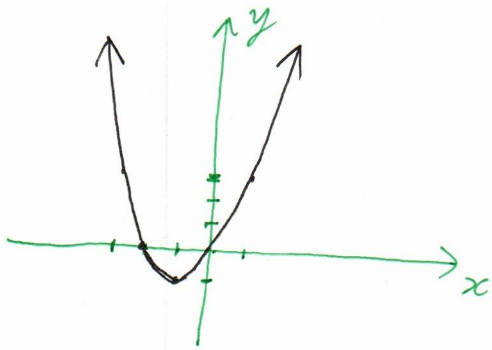
opens to $+y$ direction

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

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

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

vertex $(-1, -1)$



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26) $16x^2 + 9y^2 - 36y = 108$

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

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

$16x^2 + 9(y^2 - 4y + 4) = 108 + 9(4)$

$16x^2 + 9(y-2)^2 = 144$

$\frac{16x^2}{144} + \frac{9(y-2)^2}{144} = 1$

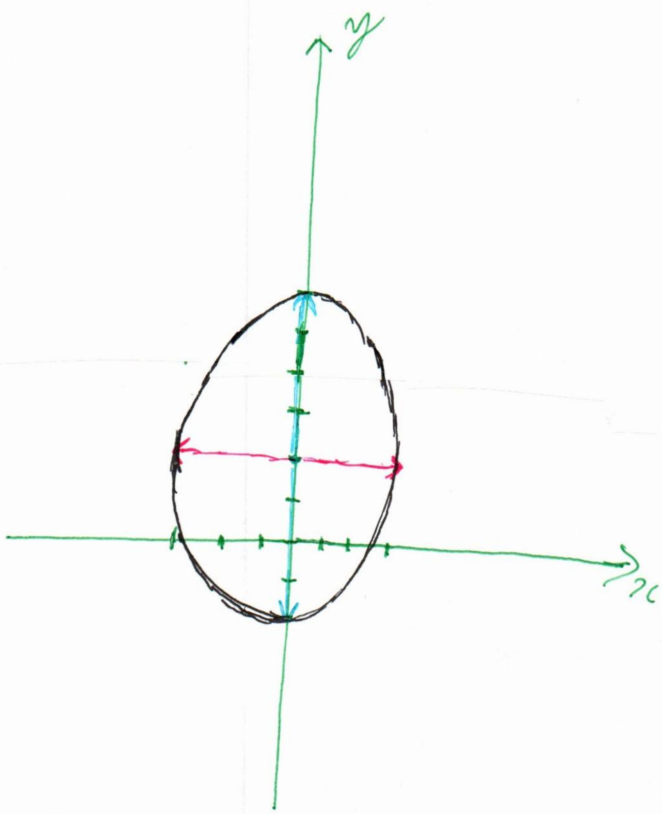
$\frac{x^2}{9} + \frac{(y-2)^2}{16} = 1$

$\frac{(y-2)^2}{(4)^2} + \frac{(x-0)^2}{(3)^2} = 1$

ellipse

longer side vertical

center: $(0, 2)$



28) $x^2 - y^2 - 4x + 3 = 0$

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

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

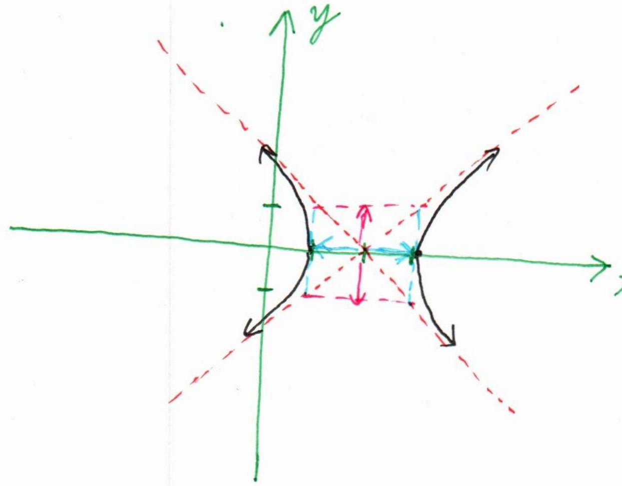
$x^2 - 4x - y^2 = -3$

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

$(x-2)^2 - (y)^2 = 1$

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

asymptotes: $y = \pm \frac{1}{1}(x-2)$



hyperbola
opens horizontally
center: $(2, 0)$

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30) $y^2 - 2x + 6y + 5 = 0$

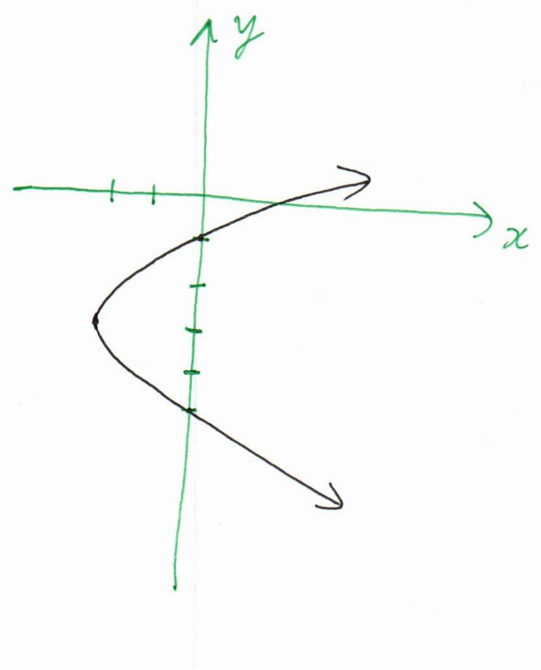
$\frac{b_y}{2} = \frac{6}{2} = 3$

$\left(\frac{b_y}{2}\right)^2 = (3)^2 = 9$

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

$(y+3)^2 = 2x + 4$

$(y-(-3))^2 = 2(x-(-2))$



parabola
opens to $+x$ direction
vertex: $(-2, -3)$

32) $4x^2+9y^2-16x+54y+61=0$

$\frac{b_x}{2} = \frac{-4}{2} = -2$ $\quad$ $\frac{b_y}{2} = \frac{6}{2} = 3$

$\left(\frac{b_x}{2}\right)^2 = (-2)^2 = 4$ $\quad$ $\left(\frac{b_y}{2}\right) = (3)^2 = 9$

$4x^2-16x+9y^2+54y=-61$

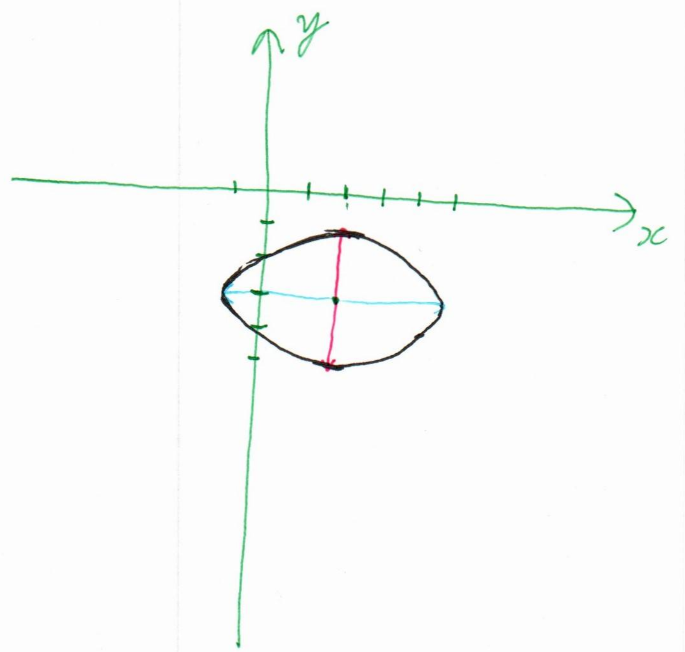
$4(x^2-4x+4)+9(y^2+6y+9)=-61+4(4)+9(9)$

$4(x-2)^2+9(y+3)^2=36$

$$\frac{4(x-2)^2}{36}+\frac{9(\ \ +3)^2}{36}=1$$

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

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



ellipse

longer side horizontal

center: (2, -3)