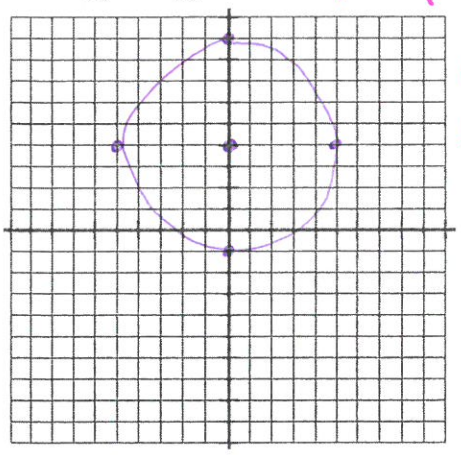
Review of Circle, Ellipse, Hyperbola and Parabola

Graph. Also find any foci (focus) and eccentricity (e).

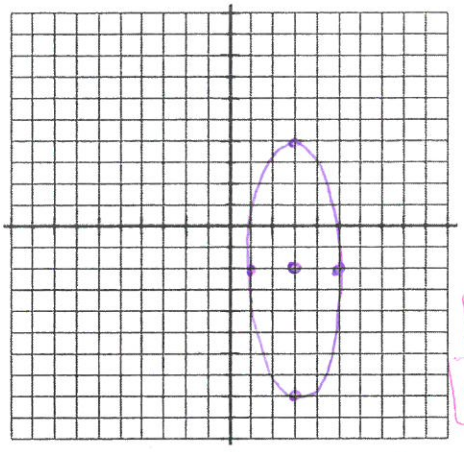
C 1. $\frac{x^2}{25}+\frac{(y-4)^2}{25}=1$ $\left(\frac{x}{5}\right)^2+\left(\frac{y-4}{5}\right)^2=1$



e = 0

f = none

E 2. $\frac{(x-3)^2}{4}+\frac{(y+2)^2}{36}=1$ $\left(\frac{x-3}{2}\right)^2+\left(\frac{y+2}{6}\right)^2=1$



a = 6

b = 2

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

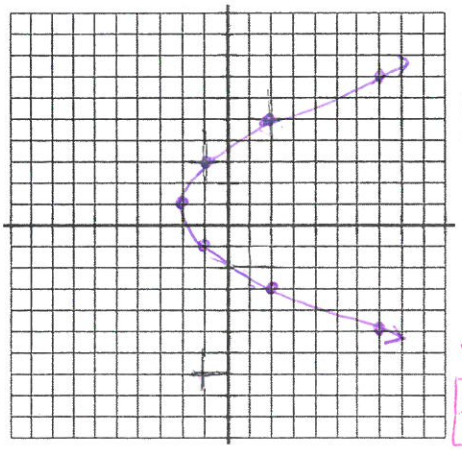
$c=\sqrt{32}$

center $(3,-2)$

foci $(3,-2\pm\sqrt{32})$

$e=\frac{\sqrt{32}}{6}$

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



e = 1

$p=\frac{1}{4(\frac{1}{4})}$

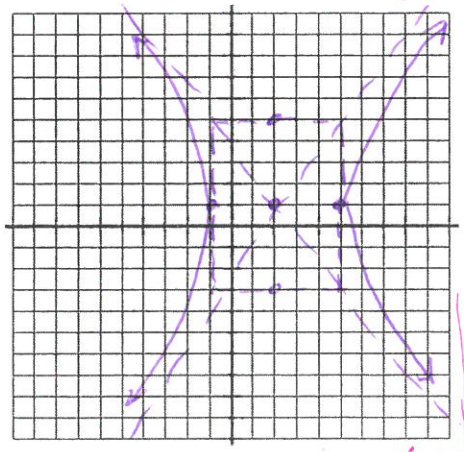
$p=1$

V = (−2, 1)

f = (−1, 1)

$a=\frac{1}{4p}$ so $p=\frac{1}{4a}$

H 4. $\frac{(x-2)^2}{9}-\frac{(y-1)^2}{16}=1$ $\left(\frac{x-2}{3}\right)^2-\left(\frac{y-1}{4}\right)^2=1$



a = 3

b = 4

$c^2=9+16$

c = 5

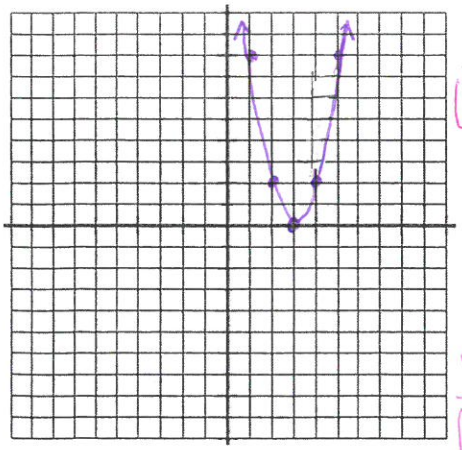
center (2, 1)

foci (2 ± 5, 1)

(7, 1) ; (−3, 1)

$e=\frac{5}{3}$

P 5. $y=2(x-3)^2$



e = 1

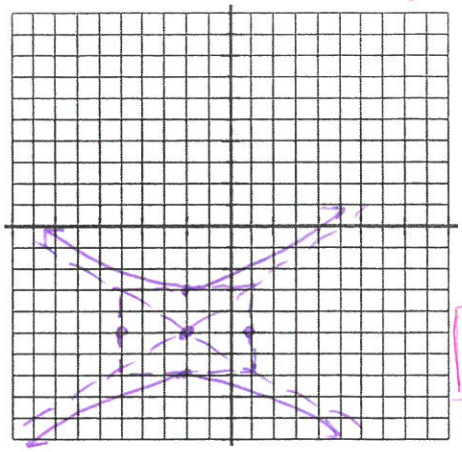
$p=\frac{1}{4(2)}$

$p=\frac{1}{8}$

V = (3, 0)

$f=(3,\frac{1}{8})$

H 6. $-\frac{(x+2)^2}{9}+\frac{(y+5)^2}{4}=1$ $-\left(\frac{x+2}{3}\right)+\left(\frac{y+5}{2}\right)^2=1$



a = 2

b = 3

$c^2=4+9$

$c=\sqrt{13}$

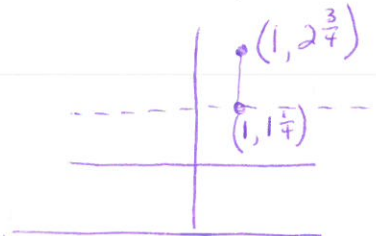
center (−2, −5)

foci $(-2,-5\pm\sqrt{13})$

$e=\frac{\sqrt{13}}{2}$

Write a Cartesian equation satisfying the given conditions. Then write the parametric equations, too.

7. parabola focus $(1, 2\frac{3}{4})$ directrix $y = 1\frac{1}{4}$



$(1, 2\frac{3}{4})$ * opens up

$V = (1, 2)$

$p = \frac{3}{4}$

$a = \frac{1}{4(\frac{3}{4})} = \frac{1}{3}$

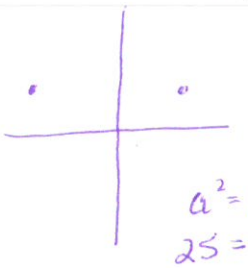
$y = \frac{1}{3}(x-1)^2 + 2$

$x = T + 1 \quad y = \frac{1}{3}T^2 + 2$

8. Ellipse

endpoints of major axis (4, 3) and (-6, 3)

foci (-5, 3) and (3, 3)



center $(-1, 3)$

$a = 5$

$c = 4$

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

$25 = b^2 + 16$

$b = 3$

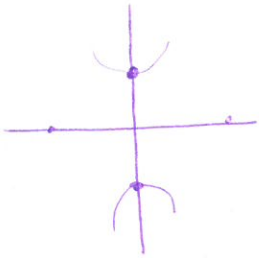
$\left(\frac{x+1}{5}\right)^2 + \left(\frac{y-3}{3}\right)^2 = 1$

$x = -1 + 5\cos T$

$y = 3 + 3\sin T$

9. hyperbola vertices (0, 3) and (0, -3)

conjugate axis of length 12

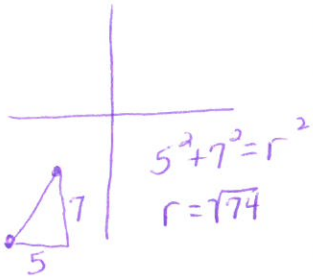


cent. $= (0, 0)$

$-\left(\frac{x}{6}\right)^2 + \left(\frac{y}{3}\right)^2 = 1$

$x = 6\tan T \quad y = 3\sec T$

10. Circle center (-9, -12) and passes through (-4, -5)



$5^2 + 7^2 = r^2$

$r = \sqrt{74}$

$(x+9)^2 + (y+12)^2 = 74$

OR

$\left(\frac{x+9}{\sqrt{74}}\right)^2 + \left(\frac{y+12}{\sqrt{74}}\right)^2 = 1$

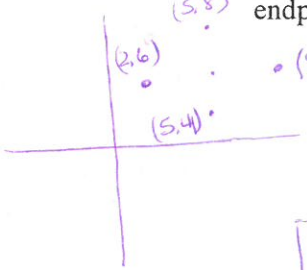
$x = -9 + \sqrt{74}\cos T$

$y = -12 + \sqrt{74}\sin T$

11. ellipse

endpoints of major axis (2, 6) and (8, 6)

endpoints of minor axis (5, 4) and (5, 8)

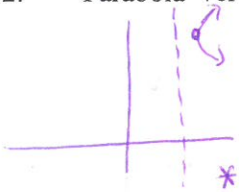


center $(5, 6)$

$\left(\frac{x-5}{3}\right)^2 + \left(\frac{y-6}{2}\right)^2 = 1$

$x = 5 + 3\cos T \quad y = 6 + 2\sin T$

12. Parabola vertex (1, 3) directrix $x = \frac{7}{8}$



$p = \frac{1}{8}$

$a = \frac{1}{4(\frac{1}{8})} = \frac{1}{\frac{1}{2}} = 2$

* opens right

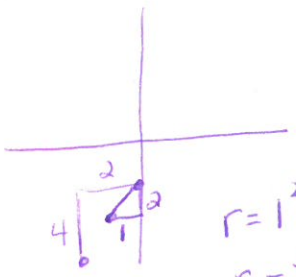
$x = 2(y-3)^2 + 1$

$x = 2T^2 + 1$

$y = T + 3$

13. circle

endpoints of diameter (-2, -9) and (0, -5)



center $(-1, -7)$

$r = 1^2 + 2^2$

$r = \sqrt{5}$

$(x+1)^2 + (y+7)^2 = 5$

OR

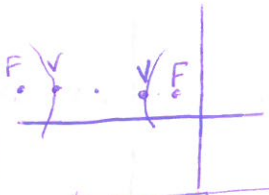
$\left(\frac{x+1}{\sqrt{5}}\right)^2 + \left(\frac{y+7}{\sqrt{5}}\right)^2 = 1$

$x = -1 + \sqrt{5}\cos T$

$y = -7 + \sqrt{5}\sin T$

14. Hyperbola vertices (-2, 1) and (-6, 1)

foci $(-4 + \sqrt{13}, 1)$ and $(-4 - \sqrt{13}, 1)$



center $= (-4, 1)$

$a = 2$

$c = \sqrt{13}$

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

$13 = 4 + b^2$

$3 = b$

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

$x = -4 + 2\sec T$

$y = 1 + 3\tan T$