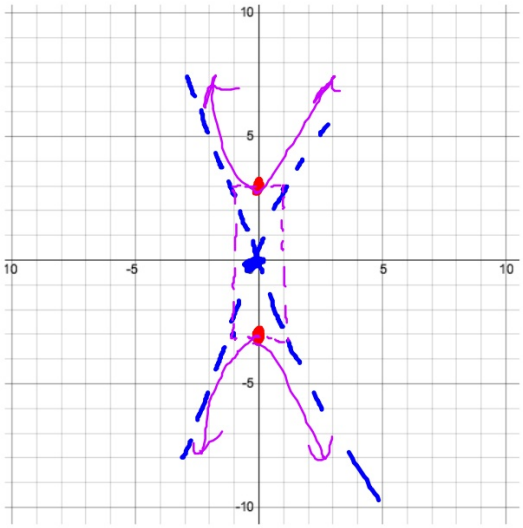
3b. $(0, \pm 3)$ $y = \pm 3x$

vertex

center: $(0, 0)$

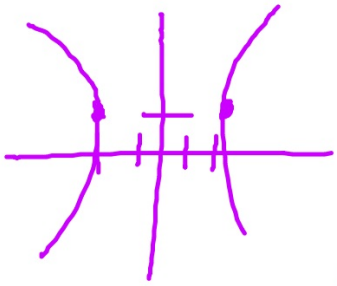
$$\frac{y^2}{9} - \frac{x^2}{1} = 1$$

HW: hyperbolas



hw
hyperbolas

4b.) vertices $(\pm 2, 1)$
thru $(5, 4)$



center $(0, 1)$

$$\frac{x^2}{4} - \frac{(y-1)^2}{b^2} = 1$$

$b^2 = \frac{12}{7}$

$$\frac{25}{4} - \frac{(3)^2}{b^2} = 1$$

$$\frac{-9}{b^2} = 1 - \frac{25}{4}$$

$$\frac{+9}{b^2} = +\frac{21}{4}$$

$$21b^2 = 36$$

$$b^2 = \frac{36}{21} = \frac{12}{7}$$

$$b^2 = \frac{12}{7}$$

2c.) $9y^2 - x^2 + 2x + 54y - 1 = 0$

$9y^2 + 54y - x^2 + 2x = 1$

HW
hyperbolas

$9(y^2 + 6y + \underline{9}) - 1(x^2 - 2x + \underline{1}) = 1$

81

-1

$\frac{9(y+3)^2}{81} - \frac{(x-1)^2}{81} = \frac{81}{81}$

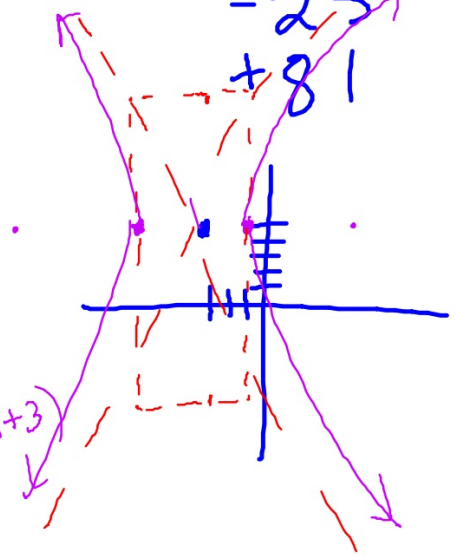
$\frac{(y+3)^2}{9} - \frac{(x-1)^2}{81} = 1$

2d.) $9x^2 + 54x - y^2 + 10y = -20$ hw hyperbolas

$9(x^2+6x+\underline{9}) - (y^2 - 10y + \underline{25}) = -20$
-25
$+81$

$\frac{9(x+3)^2}{36} - \frac{(y-5)^2}{36} = \frac{36}{36}$

$\frac{(x+3)^2}{4} - \frac{(y-5)^2}{36} = 1$

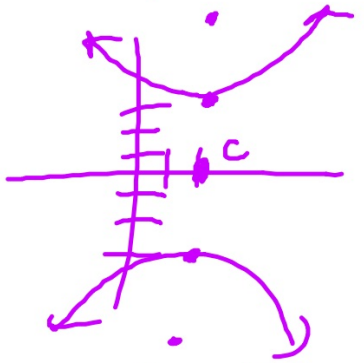


Center: $(-3, 5)$
Vertices $(-5, 5)(-1, 5)$
foci: $(-3 \pm \sqrt{40}, 5)$

HW hyperbolas

4a.) Vertices: $(2, \pm 3)$

Foci $(2, \pm 6)$



$$\frac{y^2}{9} - \frac{(x-2)^2}{27} = 1$$

$36 = a^2 + b^2$

$36 = 9 + b^2$

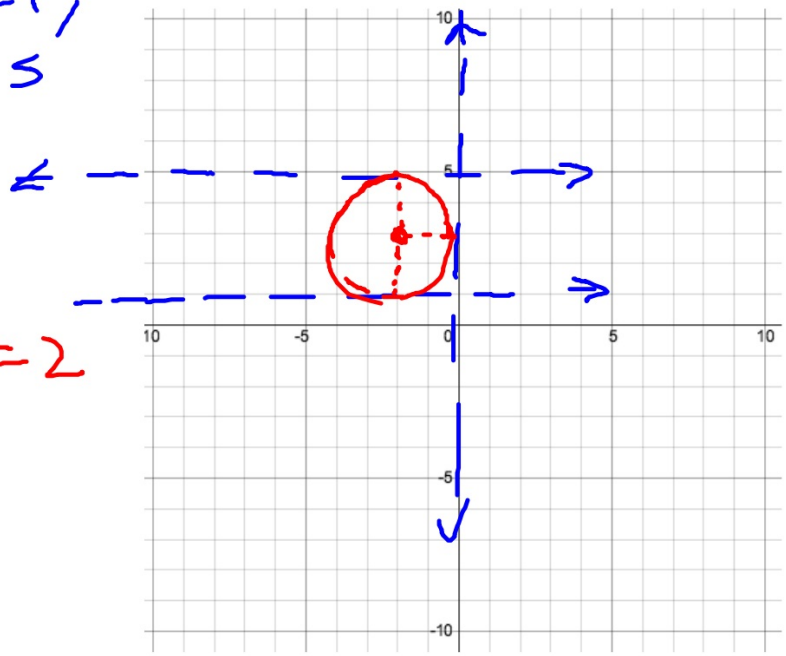
3d) Center in quad 2
tangent to $y=1$, $y=5$, y axis

$d=4$, $r=2$

center $(-2,3)$ $r=2$

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

HW
parabola/circle review



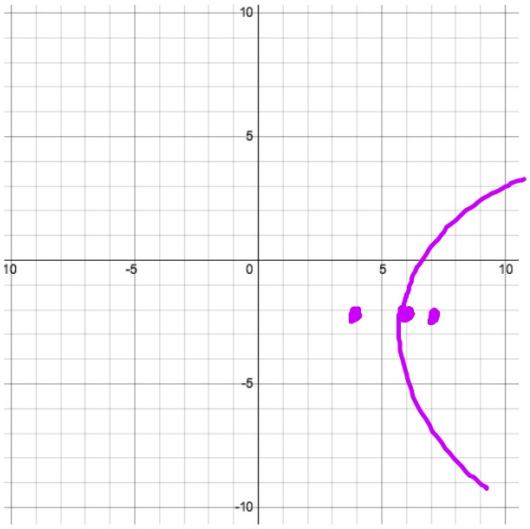
Given a hyperbola with center (4, -2), focus (7, -2) and vertex (6, -2) write the equation of the hyperbola in standard form.

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

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

$4 + b^2 = 9$

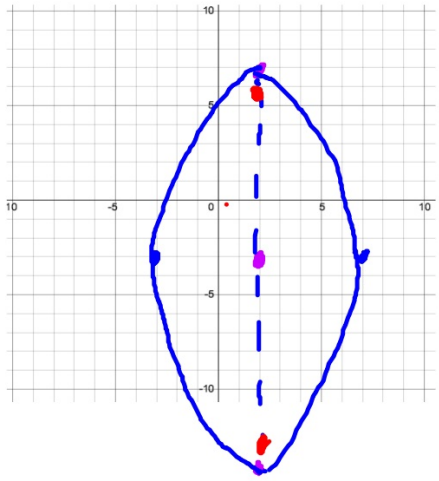
$b^2 = 5$



Ellipse: Major axis vertical length 20; length of minor axis 10

center: (2, -3)

$$\frac{(x-2)^2}{25} + \frac{(y+3)^2}{100} = 1$$



Sketch. Name the vertices, covertices, foci

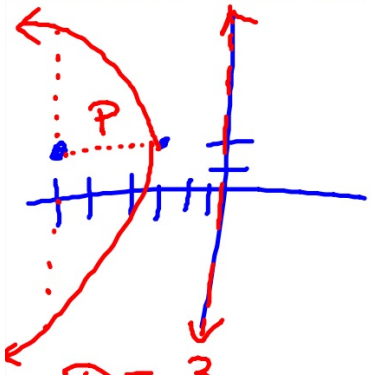
Vertices $(2, 7)(2, -13)$

Covertices $(-3, -3)(7, -3)$

foci: $a^2 - b^2 = c^2$ $\rightarrow (2, -3 \pm \sqrt{75})$

~~$100 - 25 = c^2$~~ ; $c = \sqrt{75}$

Parabola: Center (-3, 2) Focus (-6, 2)
Write the equation of the parabola in standard form and sketch.



$p = 3$

$L.R. = |4p|$

$= 12$

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

$(y-2)^2 = -12(x+3)$

Classify. Find the standard form of the conic.

$4x^2 + 25y^2 - 24x + 100y + 36 = 0$

ellipse

$4(x^2-6x+\underline{9})+25(y^2+4y+\underline{4})=-36$

$+36$

$+100$

$\frac{4(x-3)^2}{100}+\frac{25(y+2)^2}{100}=\frac{100}{100}$

$\frac{(x-3)^2}{25}+\frac{(y+2)^2}{4}=1$

HW 1 - 8 all, 9 - 21 odd

Quiz:
Sketch (graph) any conic
find a standard form of any conic (complete the square)
Write an equation given characteristics
Find vertices, foci, etc (depending on the conic)