Conic Thoughts

Recognition Thoughts

- If you have two quadratic terms you cannot determine the conic without more information, but it's not a parabola.
- You need to complete the square when you have a quadratic and linear term for a variable
- FOCI when they exist are always in the direction of the VERTICES

Parabola

- $(y-k)^2 = 4p(x-h)$ opens left or right
- $(x-h)^2 = 4p(y-k)$ opens up or down
- **If you only have one quadratic term then the conic is a parabola.**
- 4p in a parabola is the coefficient of the linear (non-quadratic) quantity)
- The FOCUS is "p away" from the vertex *inside* the parabola.
- The DIRECTRIX is "p away" from the vertex *outside* the parabola.
- The FOCAL WIDTH is |4p|
    - To get the ENDPOINTS go 2p from the FOCUS parallel to the DIRECTRIX
- x^2 opens up (p>0), or down (p<0)
- y^2 opens right (p>0), or left (p<0)
- h is always with x and k is always with y

Circles

- $(x-h)^2 + (y-k)^2 = r^2$
- **If you have 2 added (positive) quadratic quantities with coefficients that are the same or both 1, then you have a circle**
- NSEW points are a "radius away" from center
- There are no vertices in a circle

Ellipses

- $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$
- **If you have two added (positive) quadratic quantities with unlike coefficients, you have an ellipse**
- If a>b, the ellipse is wide
    - The vertices are "a away" from center (left right)

    - The covertices are “b away” away from center (north south)
- If b>a the ellipse is tall
    - The vertices are “b away” away from center (north south)
    - The covertices are “a away” from center (left right)
- The FOCUS is “c away” from the center in the vertices direction
    - c=sqrt(a^2-b^2) or c=sqrt(b^2-a^2)

Hyperbolas

- $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$ opens left and right
- $\frac{(y-k)^2}{b^2} - \frac{(x-h)^2}{a^2} = 1$ opens up an down
- **If you have one negative quadratic term it’s a hyperbola**
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    - TOTES
        - $y = \pm\frac{b}{a}(x-h)+k$
- h is always with x and k is always with y
- VERTICES are always “a away” from the center (Not true for ellipse)
- COVERTICES are always “b away” from center (Not true for ellipse)
- FOCI are based on c and in the VERTEX direction
    - c=sqrt(a^2+b^2)