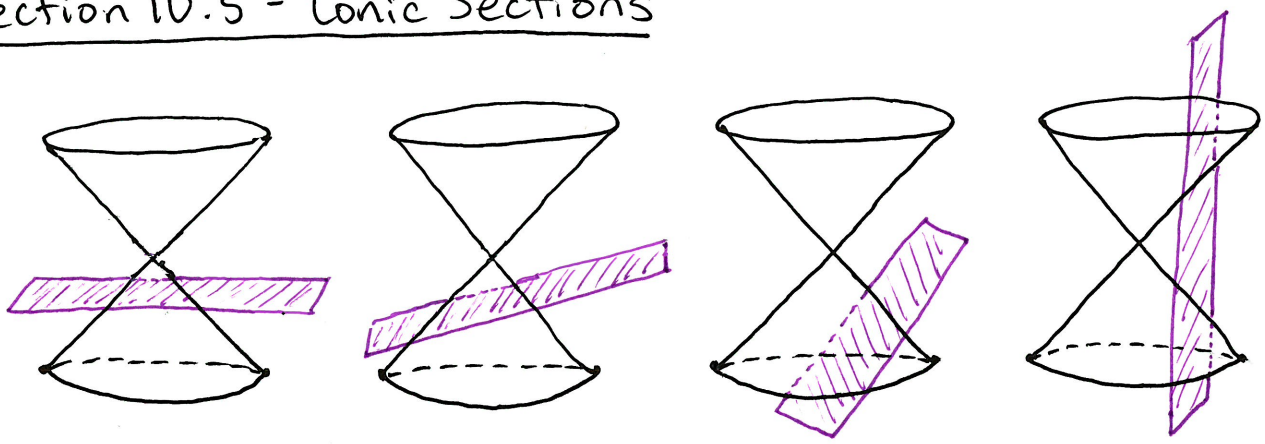
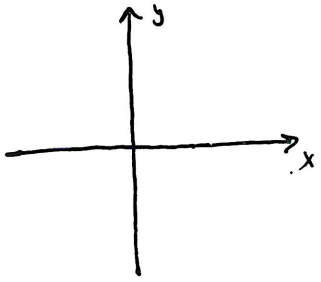
Section 10.5 - Conic Sections

MVC



- **Parabolas**: Set of all points in a plane equidistant from a point (focus) and a line (directrix)

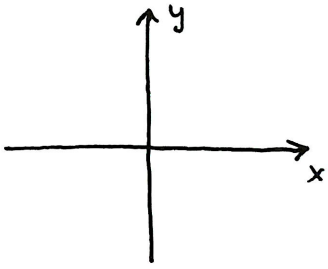


Equation:

focus:

Directrix:

vertex:



Equation:

focus:

Directrix:

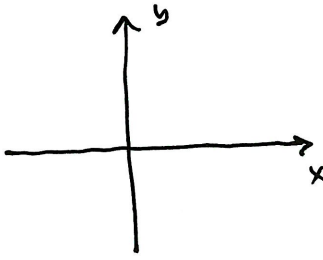
Vertex:

Standard form:

Vertex at (h,k)

General form:

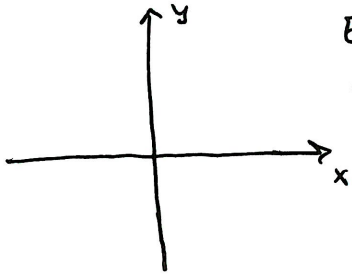
- **Ellipses**: Set of all points in a plane such that the sum of a point's distances between itself and two fixed points (foci) remains constant.



Equation:

Center:

foci:



Equation:

Center:

foci:

Standard form:

Center (h,k)

General form:

Example Identify, sketch, find foci (focus): a) $144 - 9x^2 - 16y^2 = 0$ b) $9x + 4y^2 = 36$

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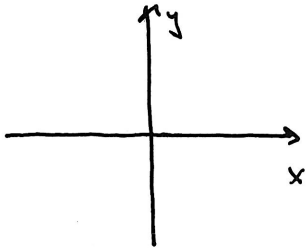
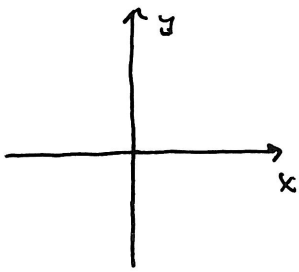
- Hyperbolas: set of all points in a plane such that the absolute value of the difference between a points distances between itself and two fixed points (foci) remains constant.



Equation:
foci:
Asymptotes:
Center:
vertices:



Equation:
foci:
Asymptotes:
Center:
vertices:

Standard form:
Center (h,k)

General form:

Example Identify, sketch, find foci, vertices, center and any asymptotes.

① $6x^2 - 6x + 6y^2 = 9/2$

② $9x^2 - 4y^2 - 72x + 8y = -176$

Example Consider $ax^2 + by^2 + cx + dy + e = 0$
What must be true about a, b, c, d, e to have:

① Circle

② Ellipse

③ Parabola

④ Hyperbola

⑤ line

⑥ No Solutions

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- Extra Examples:

* Find parametric equations for the standard form of each Conic Section.

① Circle: $(x-h)^2 + (y-k)^2 = r^2$

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

③ Parabola: $y-k = \frac{1}{4p}(x-h)^2$

④ Hyperbola: $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$

55 Determine the type of curve represented by the equation:

$$\frac{x^2}{k} + \frac{y^2}{k-16} = 1$$

in each case (a) $k > 16$ (b) $0 < k < 16$ (c) $k < 0$

56 (a) Show that the equation of the tangent line to the parabola $y^2 = 4px$ at the point (x_0, y_0) can be written as $y_0 y = 2p(x + x_0)$

(b) What is the x-intercept of this tangent line?