6-5 Videos Guide

6-5a

- Equations of conic sections
  - Circle
    - $(x-h)^2+(y-k)^2=r^2$
  - Parabolas
    - Horizontally oriented axis of symmetry
      - $y^2=4px$
      - $(y-k)^2=4p(x-h)$
    - Vertically oriented axis of symmetry
      - $x^2=4py$
      - $(x-h)^2=4p(y-k)$

6-5b

- Introduction to the ellipse

6-5c

- Equations and properties of ellipses
  - Ellipses
    - Horizontally oriented major axis
      - $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$
      - $\frac{(x-h)^2}{a^2}+\frac{(y-k)^2}{b^2}=1$
    - Vertically oriented major axis
      - $\frac{x^2}{b^2}+\frac{y^2}{a^2}=1$
      - $\frac{(x-h)^2}{b^2}+\frac{(y-k)^2}{a^2}=1$
    - Note that $a>b$
    - Locations of foci are given by $a^2=b^2+c^2$
    - Eccentricity is $e=\frac{c}{a}$ (more circular if e is close to 0 and more elongated if e is close to 1)

6-5d

- Hyperbolas
  - Horizontally oriented transverse axis
    - $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$
    - $\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1$

- Vertically oriented transverse axis
  - $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$
  - $\frac{(y-k)^2}{b^2} + \frac{(x-h)^2}{a^2} = 1$
- Location of foci are given by $c^2 = a^2 + b^2$

6-5e

- Asymptotes of a hyperbola: $y - k = \pm\frac{b}{a}(x - h)$