Course Review

Chapter 9 - Analytic Geometry - Conic Sections

9-1 Conic Sections and Circles

$(x-h)^2 + (y-k)^2 = r^2$ center: (h,k) radius: r

9-2 Parabolas

$y = \frac{1}{4p}(x-h)^2 + k$ or $x = \frac{1}{4p}(y-k)^2 + h$

vertical axis of symmetry *(when $p > 0$ opens "up")*

horizontal axis of symmetry *(when $p > 0$ opens "right")*

vertex: (h,k)
directrix: k +/- p
focus : k +/- p

9-3 Ellipses

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

horizontal major axis vertical major axis

Pythagorean Relationship: $c^2 = a^2 - b^2$

vertices: +/- a
foci: +/- c
major axis: 2a

minor axis: 2b

9-4 Hyperbolas

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

horizontal major axis vertical major axis

Pythagorean Relationship: $c^2 = a^2 + b^2$

vertices: +/- a
foci: +/- c
transverse axis: 2a
conjugate axis: 2b

9-5 General Form of Conics

$Ax^2 + By^2 + Cx + Dy + E = 0$ Use "completing the square" to put into Standard Form.

Identifying conic sections:

- Parabola: degree of one variable is 1, the degree of the other is 2
- Circle: the coefficients of the x^2 and y^2 terms are identical (including sign)
- Ellipse: the coefficients of the x^2 and y^2 terms are different, but the signs are the same
- Hyperbola: the signs of the coefficients of the x^2 and y^2 terms are different

9-6 Polar Equations of Conics

$x = r\cos\theta$
$y = r\sin\theta$

Use Pythagorean Identities to convert trigonometric functions to rectangular when needed.