

Analytic Geometry and Conic Sections for Math 230

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Quick Review on Geometry

Two lines in a plane are said to be perpendicular if their slopes are opposite reciprocals. That is given a line $y_1 = mx + b$ and a line perpendicular to it, $y_2 = nx + c$, we must have that $m \cdot n = -1$.

The distance function is used often in this section. The distance between two points (x_1, y_1) and (x_2, y_2) is defined by: distance = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Conic Sections

Any conic section in the plane, for example a line, a circle, an ellipse, a parabola or a hyperbola, can be expressed by the equation:

$$Ax^2 + By^2 + Cx + Dy + E = 0$$

If $A = B \neq 0$, we have a circle, if $A = B = 0$, we have a line. If $A = 0$ and $B \neq 0$ or $B = 0$ and $A \neq 0$, we have an ellipse. If $A \neq B$ and both A and B are not zero we have an ellipse if A and B have the same sign, and a hyperbola if A and B have opposite signs.