5/7 TUE

9.4) .... Identifying Conic Sections

$$Ax^2 + Cy^2 + Dx + Ey + F = 0$$

Bxy (rotates)

* If only one variable is squared (x^2 or y^2), then it's a Parabola. → $A \cdot C = 0$

* If both variables are squared (x^2 and y^2) & both are positive, then it's an Ellipse (or a Circle) → $A = C$ → $A \cdot C > 0$

* If both variables are squared (x^2 and y^2) & one is negative ($x^2 - y^2$ or $y^2 - x^2$), then it's a Hyperbola. → $A \cdot C < 0$

ex 1) $6x^2 + 12x + 3y + 9 = 0$. Identify the conic & complete the square!

$A = 6$ $C = 0$ (no y^2) → parabola

$6(x^2 + 2x + 1) + 3y + 9 = 0 + 6 \cdot 1$

$6(x+1)^2 + 3y + 9 = 6$

$-3y \quad -9 \qquad -3y - 9$

$\frac{6(x+1)^2}{6} = \frac{-3y - 3}{6}$

$(x+1)^2 = -\frac{1}{2}y - \frac{1}{2}$

* $(x+1)^2 = -\frac{1}{2}(y+1)$

*$(x-h)^2 = 4p(y-k)$

ex 2) $4x^2 + 8y = y^2 + 6y + 13$

$-y^2 \quad -6y - 13$

hyperbola ← $4x^2 - y^2 + 2y - 13 = 0$

$A = 4$ $C = -1$ ... $A \cdot C < 0$ hyperbola

ex 3) $-x^2 - 2x - y^2 - 2y - 6 = 0$

$A = -1$ $C = -1$ $A \cdot C > 0$ ellipse or circle

$A = C$