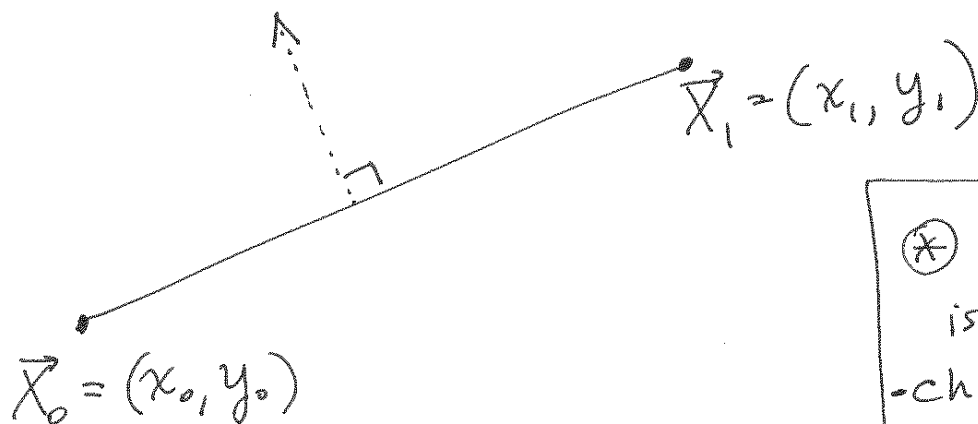


Implicit Line Equation

(~slide 14)



⊛ choice of $\vec{N}$ is not unique.
- choice of up/down
- choice of length

$$f(\vec{X}) = f(x, y) = \vec{N} \cdot (\vec{X} - \vec{X}_0) = 0$$

knowns: $\vec{X}$, $\vec{X}_0$

what is $\vec{N}$? $\vec{N}$ is orthogonal to the

vector $\vec{X}_1 - \vec{X}_0$

$$\vec{X}_1 - \vec{X}_0 = (x_1 - x_0, y_1 - y_0)$$

$$\vec{N} = (y_0 - y_1, x_1 - x_0)$$

[choose x-component negative, y-component positive, to get $\vec{N}$ as pictured] ⊛

With this choice:

$$f(x, y) = (y_0 - y_1, x_1 - x_0) \cdot (x - x_0, y - y_0) \quad \text{[pictured]} \quad \text{⊛}$$

$$= (y_0 - y_1)(x - x_0) + (x_1 - x_0)(y - y_0) = 0$$

$$= (y_0 - y_1)x + (x_1 - x_0)y - (y_0 - y_1)x_0 - (x_1 - x_0)y_0 = 0$$

symbols OVER

$$C = (y_0 - y_1)x_0 - (x_1 - x_0)y_0$$

$$= (y_0 - y_1)x_0 - (x_1 - x_0)y_0$$

$$= \underline{-x_0 y_0 + x_0 y_1} + \underline{x_0 y_0 - x_1 y_0}$$

$$= x_0 y_1 - x_1 y_0$$