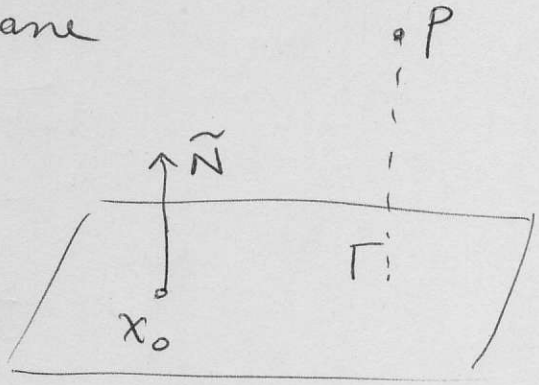
DISTANCE from a Point to a Plane

P = point off the plane

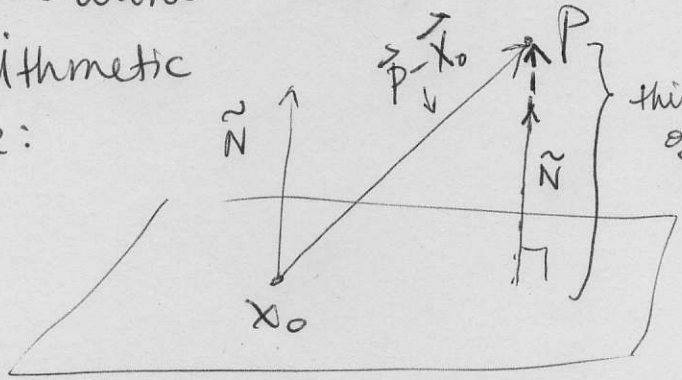
X_0 = point on the plane

$\vec{N}$ = normal to plane



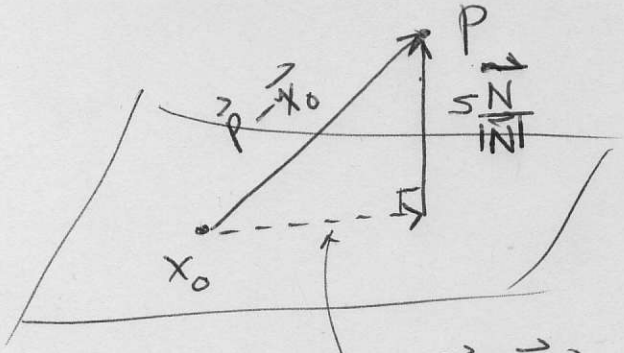
we can drop a perpendicular from P to the plane — the length of this is the distance we want

using vector arithmetic we can write:



this is a scalar multiple of $\vec{N}$ — if s = distance $\vec{P}$ to plane, this vector is $s\frac{\vec{N}}{|\vec{N}|}$

So:



$= (\vec{P}-\vec{X}_0) - s\frac{\vec{N}}{|\vec{N}|}$ is now a vector in the plane

so: $\left((\vec{P}-\vec{X}_0) - s\frac{\vec{N}}{|\vec{N}|}\right)\cdot\vec{N} = 0$ $\left(\vec{N} \perp \left[(\vec{P}-X_0) - s\frac{\vec{N}}{|\vec{N}|}\right]\right)$

solving for $s = \dfrac{(\vec{P}-\vec{X}_0)\cdot\vec{N}}{|\vec{N}|}$

The formula I gave in class is for $\vec{N}$ a unit vector only!