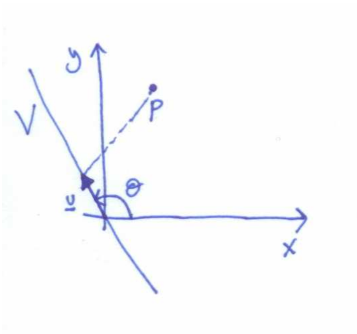
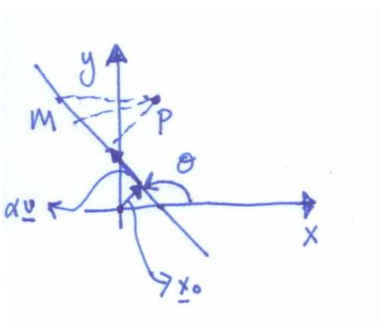
EE 503, HW #1
(Due: Oct. 13, 2009)



1. P is a point in x-y plane. V is 1-dimensional sub-space of (x,y) plane (2-dimensional space).
   $V = \{(x,y) : (x,y) = \alpha\,(-\cos\Theta, \sin\Theta),\ \alpha \in R\}$

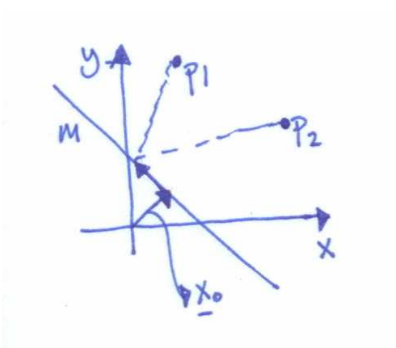
i. Find the point in V which is closest to P in the Euclidean sense.
   a. By using orthogonality of the projection error to the sub-space
   b. By optimization over α .



2. P is a point in x-y plane. M is 1-dimensional linear variety of (x,y) plane (2-dimensional space).

$$M = \{(x,y) : (x,y) = \underline{x_0} + \alpha\,(-\cos\Theta, \sin\Theta),\ \alpha \in R\}$$

i. Show that a linear variety is not a vector-space. (You may research on linear variety from internet)
ii. Find the point in M which is closest to P (in the Euclidean sense), by optimization over α .
iii. Comment on the result found ii. Is the orthogonality principle valid for linear variety ?



3. P_1 and P_2 are two points in the x-y plane. M is 1 dimensional linear variety of (x,y) plane (2-dimensional space).
   $M = \{(x,y) : (x,y) = \underline{x_0} + \alpha\,(-\cos\Theta, \sin\Theta),\ \alpha \in R\}$

i. Find the point in M which is closest to the summation of distances to P_1 and P_2.
   a. By optimization over α .
ii. Comment on the result.