Numerical Methods (CS 357)

Worksheet

Problem 1. Equation of a plane

The (non-unit-length) normal

$$n = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$$

of a plane P is given. In addition, it is known that the point

$$p = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$$

is on the plane. What is the value α on the right hand side of the point-normal equation $n \cdot x = \alpha$ for P?

Problem 2. Find an orthogonal vector

Given

$$x = \begin{bmatrix} 1 \\ 2 \\ 2 \end{bmatrix},$$

find y_3 in

$$y = \begin{bmatrix} -1 \\ 1 \\ y_3 \end{bmatrix}$$

so that $x \perp y$.

Problem 3. Orthogonalization step

Given two vectors x and y, which of the following makes $x \perp y'$?

(A) $y' = y - \frac{(x,y)}{(x,x)}x$

(B) $y' = y - \frac{(x,y)}{(y,x)}x$

(C) $y' = y - \frac{(x,y)}{(y,x)}y$

(D) $y' = y - \frac{(x,y)}{(y,y)}y$

(E) $y' = y - \frac{(x,y)}{(y,y)}x$