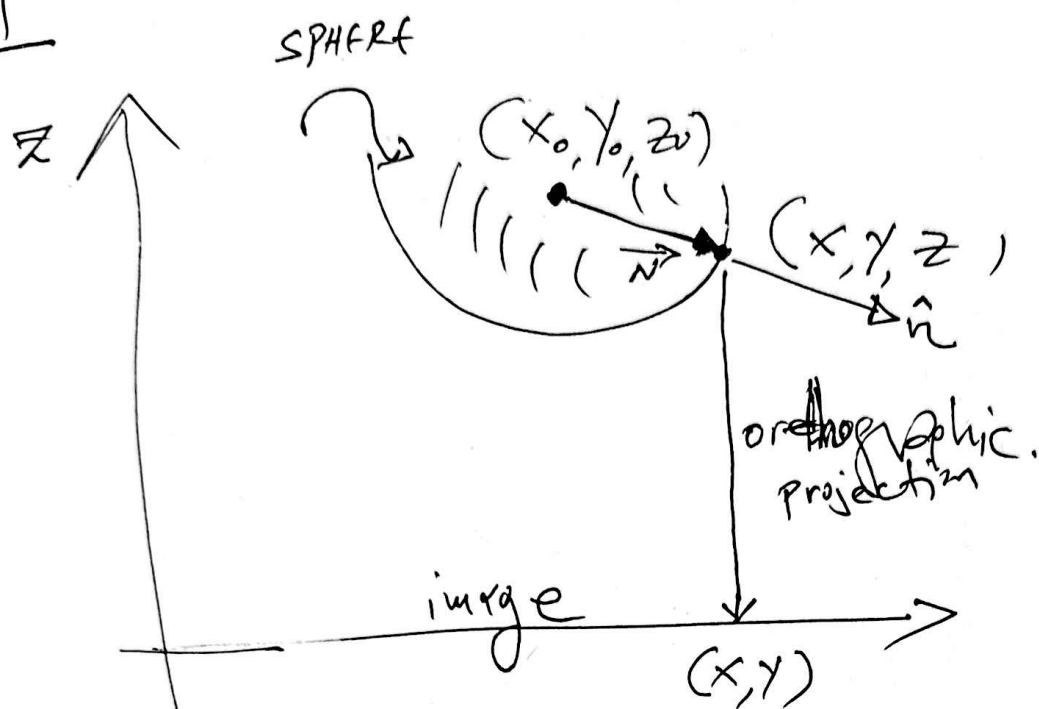


HW4

PROGRAM 2



$$\vec{N} = \begin{bmatrix} x \\ y \\ z \end{bmatrix} - \begin{bmatrix} x_0 \\ y_0 \\ z_0 \end{bmatrix} = \begin{bmatrix} x - x_0 \\ y - y_0 \\ z - z_0 \end{bmatrix}$$

$$(x - x_0)^2 + (y - y_0)^2 + (z - z_0)^2 = R^2 = D$$

Non-unit Normal

$$(z - z_0)^2 = R^2 - (x - x_0)^2 - (y - y_0)^2$$

$$(z - z_0) = \oplus \sqrt{R^2 - (x - x_0)^2 - (y - y_0)^2}$$

$$\vec{N} = \begin{bmatrix} x - x_0 \\ y - y_0 \\ \sqrt{R^2 - (x - x_0)^2 - (y - y_0)^2} \end{bmatrix} = \begin{bmatrix} N_1 \\ N_2 \\ N_3 \end{bmatrix}$$

x_0, y_0, R calculated from P_1

x, y is pixel of brightest point in each image.

CALCULATION
OF NORMAL
 \hat{n} FROM
BRIGHTEST
PIXEL
 (x, y)

UNIT
NORMAL

$$\hat{n} = \frac{1}{\sqrt{N_1^2 + N_2^2 + N_3^2}} \begin{bmatrix} N_1 \\ N_2 \\ N_3 \end{bmatrix}$$