

$$g: \vec{x} = \begin{pmatrix} 0 \\ 1 \\ -1 \end{pmatrix} + t \cdot \begin{pmatrix} 4 \\ -3 \\ 5 \end{pmatrix} \quad P(0|0|p)$$

$$R(2+4t \mid 1-3t \mid -1+5t)$$

$$\vec{PR} = \begin{pmatrix} 2+4t \\ 1-3t \\ -1+5t-p \end{pmatrix}$$

$$\begin{pmatrix} 2+4t \\ 1-3t \\ -1+5t-p \end{pmatrix} \cdot \begin{pmatrix} 4 \\ -3 \\ 5 \end{pmatrix} \stackrel{!}{=} 0$$

$$4 \cdot (2+4t) - 3 \cdot (1-3t) + 5 \cdot (-1+5t-p) = 0$$

$$8 + 16t - 3 + 9t - 5 + 25t - 5p = 0$$

$$50t - 5p = 0 \quad | +5p$$

$$50t = 5p \quad | :50$$

$$t = \frac{1}{10} p$$

$$\vec{PR} = \begin{pmatrix} 2 + \frac{2}{5}p \\ 1 - \frac{3}{10}p \\ -1 + \frac{1}{2}p - p \end{pmatrix} = \begin{pmatrix} \frac{2}{5}p + 2 \\ -\frac{3}{10}p + 1 \\ -\frac{1}{2}p - 1 \end{pmatrix}$$

$$|\vec{PR}| = \sqrt{\left(\frac{2}{5}p + 2\right)^2 + \left(-\frac{3}{10}p + 1\right)^2 + \left(-\frac{1}{2}p - 1\right)^2}$$

$$= \sqrt{\frac{4}{25}p^2 + \frac{8}{5}p + 4 + \frac{9}{100}p^2 - \frac{3}{5}p + 1 + \frac{1}{4}p^2 + p + 1}$$

$$= \sqrt{\frac{1}{2}p^2 + 2p + 6}$$

GTR: Minimum:  $u(-2 \mid 2)$

$$\rightarrow p_{\min} = -2 \quad \Rightarrow P(0|0|-2) \quad d=2$$