

Math 307 Homework
November 16, 2015

1. Find the point in

$$U = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} \middle| 3x - y - 5z = 0 \right\}$$

which is closest to $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$.

2. Find the quadratic polynomial $p \in \mathcal{P}_2(\mathbb{R})$ such that

$$\int_{-1}^1 (p(x) - |x|)^2 dx$$

is as small as possible.

3. Show that if V is a finite dimensional inner product space and U is a subspace of V , then

$$\text{tr } \mathbf{P}_U = \text{rank } \mathbf{P}_U = \dim U.$$