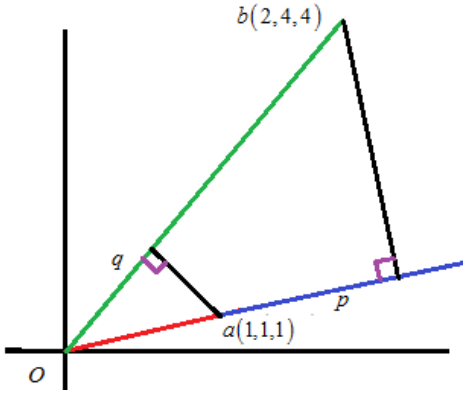
Step-1



Step-2

The vector p is the projection of b upon a.

So, the length of p is the part of $a(1,1,1)$ closest the vector b.

We know that the projection p is given by $\frac{a^T b}{a^T a}a$

$$p = \frac{(1,1,1)\begin{pmatrix}2\\4\\4\end{pmatrix}}{(1,1,1)\begin{pmatrix}1\\1\\1\end{pmatrix}}(1,1,1)$$

$$= \frac{2+4+4}{1+1+1}(1,1,1)$$

$$= \frac{10}{3}(1,1,1)$$

So, the projection of b upon a is bigger than the length of a by 10/3 times.

The nearest point is $\boxed{\left(\frac{10}{3},\frac{10}{3},\frac{10}{3}\right)}$

Step-3

Similarly, q is the projection of a upon b is given by $\frac{b^T a}{b^T b} b$

$$q = \frac{(2,4,4)\begin{pmatrix}1\\1\\1\end{pmatrix}}{(2,4,4)\begin{pmatrix}2\\4\\4\end{pmatrix}}(2,4,4)$$

$$= \frac{2+4+4}{4+16+16}(2,4,4)$$

$$= \frac{5}{18}(2,4,4)$$

So, the nearest part of a to the part of b is $5/18^{th}$ part of b.

The nearest point is $\boxed{\left(\frac{5}{9}, \frac{10}{9}, \frac{10}{9}\right)}$

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