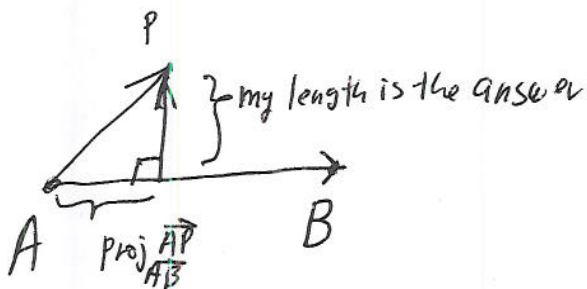


Quiz 2 Math 241 Spring 2008

Find the distance from the point $P = (-3, 1, 2)$ to the line through $A = (1, 1, 0)$ and $B = (-2, 3, -4)$.



$$\text{ans} = \left\| \vec{AP} - \text{proj}_{\vec{AB}} \vec{AP} \right\| = \left\| \vec{AP} - \frac{\vec{AB} \cdot \vec{AP}}{\vec{AB} \cdot \vec{AB}} \vec{AB} \right\|$$

$$= \left\| \langle -4, 0, 2 \rangle - \frac{\langle -3, 2, -4 \rangle \cdot \langle -4, 0, 2 \rangle}{\langle -3, 2, -4 \rangle \cdot \langle -3, 2, -4 \rangle} \langle -3, 2, -4 \rangle \right\|$$

$$= \left\| \langle -4, 0, 2 \rangle - \frac{4}{9+4+16} \langle -3, 2, -4 \rangle \right\|$$

$$= \frac{2}{29} \left\| 29 \langle -2, 0, 1 \rangle - 2 \langle -3, 2, -4 \rangle \right\|$$

$$= \frac{2}{29} \left\| \langle -58, 0, 29 \rangle - \langle -6, 4, -8 \rangle \right\|$$

$$= \frac{2}{29} \left\| \langle -52, -4, 37 \rangle \right\|$$

$$= \frac{2}{29} \sqrt{(52)^2 + 16 + (37)^2}$$