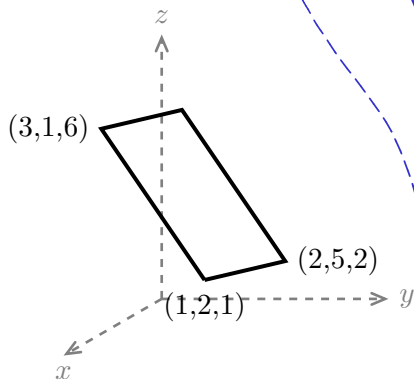


Cross product

1. a) Compute $\langle 1, 3, 1 \rangle \times \langle 2, -1, 5 \rangle$.

b) Compute $(\mathbf{i} + 2\mathbf{j}) \times (2\mathbf{i} - 3\mathbf{j})$.

2. Find the area of the parallelogram shown.



$$\begin{aligned} & | \langle 1, 3, 1 \rangle \times \langle 2, -1, 5 \rangle | \\ &= \left| \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 3 & 1 \\ 2 & -1 & 5 \end{vmatrix} \right| \end{aligned}$$

$$\begin{aligned} &= \left| \hat{i}(16) - \hat{j}(3) + \hat{k}(-7) \right| = \sqrt{256 + 9 + 49} \\ &= \sqrt{314} \end{aligned}$$

Yes I did a fumble here, I always do

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 3 & 1 \\ 2 & -1 & 5 \end{vmatrix} = \hat{i}(16) - \hat{j}(3) + \hat{k}(-7)$$

$$\begin{aligned} & (\hat{i} + 2\hat{j}) \times (2\hat{i} - 3\hat{j}) \\ &= 2\hat{i} \times \hat{i} - \hat{i} \times 3\hat{j} \end{aligned}$$

$$+ 2\hat{j} \times 2\hat{i} + 2\hat{j} \times (-3\hat{j})$$

$$\begin{aligned} &= -3\hat{i} \times \hat{j} - 4\hat{i} \times \hat{j} \\ &= -7(\hat{i} \times \hat{j}) = -7\hat{k} \end{aligned}$$

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