

**3.16** Given  $\mathbf{B} = \hat{\mathbf{x}}(z - 3y) + \hat{\mathbf{y}}(2x - 3z) - \hat{\mathbf{z}}(x + y)$ , find a unit vector parallel to  $\mathbf{B}$  at point  $P = (1, 0, -1)$ .

**Solution:** At  $P = (1, 0, -1)$ ,

$$\mathbf{B} = \hat{\mathbf{x}}(-1) + \hat{\mathbf{y}}(2 + 3) - \hat{\mathbf{z}}(1) = -\hat{\mathbf{x}} + \hat{\mathbf{y}}5 - \hat{\mathbf{z}},$$

$$\hat{\mathbf{b}} = \frac{\mathbf{B}}{|\mathbf{B}|} = \frac{-\hat{\mathbf{x}} + \hat{\mathbf{y}}5 - \hat{\mathbf{z}}}{\sqrt{1 + 25 + 1}} = \frac{-\hat{\mathbf{x}} + \hat{\mathbf{y}}5 - \hat{\mathbf{z}}}{\sqrt{27}}.$$

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