

**Exercise 13**

Find  $b$  and  $c$  so that  $(5, b, c)$  is orthogonal to both  $(1, 2, 3)$  and  $(1, -2, 1)$ .

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**Solution**

For a vector to be orthogonal to another, their dot product must be zero.

$$\begin{aligned}(5, b, c) \cdot (1, 2, 3) &= 0 & (5, b, c) \cdot (1, -2, 1) &= 0 \\ 5 + 2b + 3c &= 0 & 5 - 2b + c &= 0\end{aligned}$$

Solve this system of equations for  $b$  and  $c$ .

$$b = \frac{5}{4} \quad \text{and} \quad c = -\frac{5}{2}$$