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Math 40
Vectors and Vector Spaces
Friday, January 20, 2016

1.2.{ 5, 9, 15, 17, 18, 30}

5 Find $\mathbf{u} \cdot \mathbf{v}$ when $\mathbf{u} = \begin{bmatrix} 1 \\ \sqrt{2} \\ \sqrt{3} \\ 0 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} 4 \\ -\sqrt{2} \\ 0 \\ -5 \end{bmatrix}$.

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9 Find $\|\mathbf{u}\|$ for $\mathbf{u} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and give a unit vector in the direction of $\mathbf{u}$.

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15 Find the distance $d(\mathbf{u}, \mathbf{v})$ between $\mathbf{u}$ and $\mathbf{v}$ when $\mathbf{u} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$.

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17 If **u**,**v**,and **w** are vectors in , $\mathbb{R}^n$, $n \geq 2$ and c is a scalar, explain why the following expressions make no sense:

(a) $\|\mathbf{u} \cdot \mathbf{v}\|$

(b) $\mathbf{u} \cdot \mathbf{v} + \mathbf{w}$

(c) $\mathbf{u} \cdot (\mathbf{v} \cdot \mathbf{w})$

(d) $c \cdot (\mathbf{u} + \mathbf{v})$

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18 Determine whether the angle between $\mathbf{u} = \begin{bmatrix} 3 \\ 0 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$ is acute, obtuse, or a right angle.

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30
Let $A = (-3, 2)$, $B = (1, 0)$, and $C = (4, 6)$. Prove that $\triangle\ ABC$ is a right-angled triangle.

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