

For the following problems find the dot product of the two vectors:

1. $\vec{a} = \langle 3, 5 \rangle$ and $\vec{b} = \langle -2, 3 \rangle$

2. $\vec{c} = \langle 1, -7 \rangle$ and $\vec{d} = \langle -2, -4 \rangle$

3. $\vec{e} = \frac{2}{3}\vec{i} + \frac{3}{2}\vec{j}$ and $\vec{f} = -\frac{5}{2}\vec{i} + \frac{4}{3}\vec{j}$

4. $\vec{g} = -3\vec{i} + 5\vec{j}$ and $\vec{h} = -5\vec{i} - 3\vec{j}$

For the following problems find the angle between the two given vectors. Use $[0^\circ, 360^\circ)$. (round to the nearest 100^{th}):

5. $\vec{u} = 3\vec{i} - 5\vec{j}$ and $\vec{v} = -6\vec{i} - 2\vec{j}$

6. $\vec{v} = \langle -8, -3 \rangle$ and $\vec{w} = \langle 3, -8 \rangle$

7. $\vec{u} = \vec{i} + 3\vec{j}$ and $\vec{v} = -2\vec{j}$

8. $\vec{v} = \frac{2}{3}\vec{i} + \frac{3}{2}\vec{j}$ and $\vec{w} = -\frac{5}{2}\vec{i} + \frac{4}{3}\vec{j}$

For the following problems determine if the vectors are orthogonal (explain mathematically):

9. $\vec{v} = \langle -8, -3 \rangle$ and $\vec{w} = \langle 3, -8 \rangle$

10. $\vec{v} = \langle 0, -7 \rangle$ and $\vec{w} = \langle 11, -2 \rangle$

11. $\vec{u} = \vec{i} + 2\vec{j}$ and $\vec{v} = 2\vec{i} - \vec{j}$

12. $\vec{u} = 10\vec{i} - 2\vec{j}$ and $\vec{v} = 2\vec{i} + 9\vec{j}$

For the following problems find the dot product of the vectors given their magnitude and the angle in between the two vectors (round to the nearest hundredth):

13. If $||\vec{a}|| = 7$, $||\vec{b}|| = 8$, and $\theta = 155^\circ$

14. If $||\vec{c}|| = 3$, $||\vec{d}|| = 11$, and $\theta = 65^\circ$

15. If $||\vec{e}|| = 5$, $||\vec{f}|| = 7$, and $\theta = 102^\circ$

16. If $||\vec{g}|| = 11$, $||\vec{h}|| = 2$, and $\theta = 14^\circ$

For the following problems find the angle between the two vectors given their dot product. Use $[0^\circ, 360^\circ)$. (round to the nearest hundredth):

17. If $||\vec{g}|| = 10$, $||\vec{h}|| = 20$, and $\vec{g} \cdot \vec{h} = -35$ find θ

18. If $||\vec{v}|| = 12$, $||\vec{w}|| = 6$, and $\vec{v} \cdot \vec{w} = 67$ find θ

Answers:

- 1) 9 2) 26 3) 1/3 4) 0 5) 102.53° 6) 90° 7) 161.57° 8) 85.89° 9) yes 10) no
11) yes 12) no 13) -50.75 14) 13.95 15) -7.28 16) 21.35 17) 100.08° 18) 21.48°