

No calculators will be allowed and no partial credit will be given.

1. Find the dot product of $\vec{r} = \langle 1, -2 \rangle$ and $\vec{s} = \langle 3, 4 \rangle$.
2. Find the dot product of $\vec{u} = \langle 2, -2, -2 \rangle$ and $\vec{v} = \langle 2, -2, 4 \rangle$.
3. Find the cosine of the angle between vectors $\vec{r} = \langle 3, -2 \rangle$ and $\vec{s} = \langle 1, 5 \rangle$.
4. Find the cosine of the angle between vectors $\vec{r} = \langle 1, -1, 5 \rangle$ and $\vec{s} = \langle 0, 5, 3 \rangle$.
5. Determine if the vectors $\vec{u} = \langle 1, 2, -3 \rangle$ and $\vec{v} = \langle -2, -4, 6 \rangle$ are orthogonal, parallel, or neither.
6. Find the vector projection of $\vec{a} = \langle 2, -1 \rangle$ onto $\vec{b} = \langle 2, 4 \rangle$.
7. Find the vector projection of $\vec{a} = \langle -1, -1, -2 \rangle$ onto $\vec{b} = \langle 3, 4, 2 \rangle$.

1. -5

2. 0

3. $-\frac{7}{\sqrt{13}\sqrt{26}}$

4. $\frac{10}{3\sqrt{3}\sqrt{34}}$

5. *Parallel*

6. $\langle 0, 0 \rangle$

7. $\langle -\frac{33}{29}, -\frac{44}{29}, -\frac{22}{29} \rangle$