

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

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

1. -1

2. 4

3. $\frac{40}{41}$

4. $\frac{11}{\sqrt{13}\sqrt{33}}$

5. *Neither*

6. $\langle -\frac{21}{25}, -\frac{28}{25} \rangle$

7. $\langle \frac{16}{9}, \frac{8}{9}, \frac{16}{9} \rangle$