

Name: _____

(20 points total)

1. (7 points) Let $\mathbf{u} = 5\mathbf{i} - 12\mathbf{k}$ and $\mathbf{v} = 2\mathbf{i} + 2\mathbf{j} + \mathbf{k}$. Find

(a) The cosine of the angle between \mathbf{u} and \mathbf{v} .

(b) $\text{proj}_{\mathbf{v}}\mathbf{u}$.

2. (5 points) Find a vector of magnitude 8 in the direction of $\mathbf{i} + 2\mathbf{j} - 2\mathbf{k}$. Write your answer in the form $a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$.

3. (5 points) Using either a single equation or a pair of equations, describe the circle of radius 3 centered at the point $(4, 0, 0)$ and lying in the plane $x = 4$.

4. (3 points) Are the vectors $3\mathbf{i} + 4\mathbf{j} - \mathbf{k}$ and $-3\mathbf{i} + 3\mathbf{j} + 2\mathbf{k}$ perpendicular? Justify your answer.