1. Let $\mathbf{v} = \langle 5, k, ak \rangle$ be a non-zero vector.

[2]     (a) Find some real numbers $a$ and $k$ (or show no such values exists) so that $\mathbf{v}$ is perpendicular to $\langle 8, 4, 3 \rangle$. Be sure to justify your answer.

[4]     (b) Find some real numbers $a$ and $k$ (or show no such values exists) so that $\mathbf{v}$ is the same direction as $\langle 3, -3, 6 \rangle$. Be sure to justify your answer. HINT: **Do not use a dot product to do this**.