**Name:** **Tutorial day and time:**

**Number of the *completed* problem you want feedback on:**

1. Calculate the four 4th roots of the complex number $z = -2\sqrt{3} + 2i$.

2. Let $P = (1, 0, -2)$, $Q = (-3, 2, 4)$, and $R = (0, 5, -1)$ be points in $\mathbb{R}^3$.

   (a) Calculate the vectors $\vec{u} = \overrightarrow{PQ}$, $\vec{v} = \overrightarrow{QR}$, and $\vec{w} = \overrightarrow{PR}$.

   (b) Check that $\vec{u} + \vec{v} = \vec{w}$.

   (c) Explain, with a diagram, why your result in part (b) makes sense. (You do not have to accurately plot the points $P, Q, R$.)

3. Let $\vec{a} = \langle 2, -4, 3\rangle$, $\vec{b} = \langle -5, 2, 7\rangle$, and $\vec{c} = \langle 1, 0, -3\rangle$. Calculate the following:

   (a) $4\vec{a} - 3\vec{b}$

   (b) $\|3\vec{c}\|$

   (c) $3\|\vec{c}\|$

   (d) $\vec{a} \cdot (2\vec{b} - \vec{c})$

   (e) $2(\vec{a} \cdot \vec{b}) - \vec{a} \cdot \vec{c}$

4. Referring to the diagram below, argue that the indicated distance $d$ is given by $d = \dfrac{\vec{a} \cdot \vec{b}}{\|\vec{a}\|}$.