2. (a) Given two vectors in $\mathbb{R}^3$, (x_1, y_1, z_1) and (x_2, y_2, z_2), give the mathematical condition for the two vectors to be perpendicular in words, and as an equation. [2]

(b) Suppose that three points in $\mathbb{R}^3$ have position vectors $\underline{p} = (1, 2, 3)$, $\underline{q} = (2, 4, 5)$, and $\underline{r} = (3, 3, 1)$. Find the angle between the vectors $(\underline{q} - \underline{p})$ and $\underline{q} - \underline{r})$. [2]

(c) State De Moivre's theorem for computing powers of complex numbers. [4]
Hence find all $x \in \mathbb{C}$ such that $x^3 = -1$, writing your answer in the form $a + bi$, where $i = \sqrt{-1}$.