Problem 1 Show that if $\vec{a}$ and $\vec{b}$ are perpendicular, then $\|\vec{a} + 2\vec{b}\|^2 = \|\vec{a}\|^2 + 4\|\vec{b}\|^2$.

Problem 2 Find an an equation for the line between the points $P = (1, 0, -2)$ and $Q = (2, 1, 0)$. Then find where this line intersects the coordinate planes (that is, the x-y, y-z, and x-z planes).