Math 200-108 Quiz 1 (10 points)

NAME: ___________________________ UBC ID: ___________________________

1. Given \( A(0,2,1), B(0,0,-1), \)
   
   (a) Find the equation of all points which are equidistant to \( A, B. \) (You don’t need to simplify the equation) (3 points)
   
   (b) Find the equation of all points \( P \) such that \( \vec{AP} \) is orthogonal to \( \vec{BP}, \) and describe the geometric shape of this equation. (7 points)

\[
\begin{align*}
\text{a). } & \quad x^2 + (y-2)^2 + (z-1)^2 \\
& = x^2 + y^2 + (z+1)^2
\end{align*}
\]

\[
\text{b). } \vec{AP} \perp \vec{BP} \Rightarrow \vec{AP} \cdot \vec{BP} = 0.
\]

So \( \langle x, y-2, z-1 \rangle \cdot \langle x, y, z+1 \rangle \)

\[
= x^2 + y^2 - 2y + z^2 - 1 = 0
\]

\[
\Rightarrow x^2 + (y-1)^2 + z^2 = 2
\]

Sphere with center \((0, 1, 0)\) and radius \(\sqrt{2} \).